

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE		PAGE OF PAGES	
2. AMENDMENT/MODIFICATION NO.		3. EFFECTIVE DATE		4. REQUISITION/PURCHASE REQ. NO.		5. PROJECT NO. <i>(If applicable)</i>	
6. ISSUED BY		CODE		7. ADMINISTERED BY <i>(If other than Item 6)</i>		CODE	
8. NAME AND ADDRESS OF CONTRACTOR <i>(No., street, county, State and ZIP Code)</i>				(X)		9A. AMENDMENT OF SOLICIATION NO.	
						9B. DATED <i>(SEE ITEM 11)</i>	
						10A. MODIFICATION OF CONTRACT/ORDER NO.	
						10B. DATED <i>(SEE ITEM 11)</i>	
CODE		FACILITY CODE					

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers
☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. **FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER.** If by virtue of this amendment your desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA *(If required)*

**13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS.
IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.**

CHECK ONE	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: <i>(Specify authority)</i> THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES <i>(such as changes in paying office, appropriation date, etc.)</i> SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER <i>(Specify type of modification and authority)</i>

E. IMPORTANT: Contractor ☐ is not, ☐ is required to sign this document and return _____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION *(Organized by UCF section headings, including solicitation/contract subject matter where feasible.)*

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER <i>(Type or print)</i>		16A. NAME AND TITLE OF CONTRACTING OFFICER <i>(Type or print)</i>	
15B. CONTRACTOR/OFFEROR		16B. UNITED STATES OF AMERICA	
15C. DATE SIGNED		16C. DATE SIGNED	
<div style="border-top: 1px solid black; width: 100%;"></div> <i>(Signature of person authorized to sign)</i>		<div style="border-top: 1px solid black; width: 100%;"></div> <i>(Signature of Contracting Officer)</i>	

Item 14. Continued.

CHANGES TO THE BIDDING SCHEDULE

1. Replace the Bidding Schedule with the accompanying new Bidding Schedule, bearing the notation "AMENDMENT NO. 0001."

CHANGES TO THE SPECIFICATIONS AND DRAWINGS

2. Add the following Technical Specifications:

SECTION 02070 - SELECTIVE DEMOLITION
SECTION 02110 - SITE CLEARING
SECTION 02160 - EXCAVATION SUPPORT SYSTEMS
SECTION 02200 – EARTHWORK
SECTION 02511 - HOT-MIXED ASPHALT PAVING
SECTION 02520 - PORTLAND CEMENT CONCRETE PAVING
SECTION 02668 - WATER SERVICE PIPING
SECTION 02930 - LAWNS AND GRASSES
SECTION 03300 - CAST-IN-PLACE CONCRETE
SECTION 07900 - JOINT SEALERS

3. Add the following drawings and sketches:

- a) Drawings Nos. 1.0 thru 8.0 (9 pages)
- b) Sheet Nos. 1 of 30 thru 30 of 30 (30 pages)
- c) Sketch DO-B7279-1 (1 page)

END OF AMENDMENT

BIDDING SCHEDULE
(To Be Attached to SF 1442)

Requirements Contract For Repair and Installation of Water Distribution Lines
Joint Readiness Training Center and Fort Polk
Fort Polk, Louisiana
Solicitation No. DACA63-02-B-0007
AMENDMENT NO. 0001
BASE YEAR

ITEM	DESCRIPTION	ESTIMATED QUANTITIES	UNIT	UNITS PRICES	ESTIMATED AMOUNTS
0001	Base Bid: All work required by the Specifications for the initial period which is 365 calendar days from date of award.				
0001AA	Furnish and install Hose Connection Vacuum Breaker (HCVB) per Drawing No. 1.0	10	EA	\$ _____	\$ _____
0001AB	Furnish and install Hose Connection with Vacuum Breaker per Drawing No. 1.1	10	EA	\$ _____	\$ _____
0001AC	Furnish and install Laboratory Faucet Backflow Device (LFBD) per Drawing No. 2.0	2	EA	\$ _____	\$ _____
0001AD	Furnish, install, and test Reduced Pressure Zone (RPZ) Device per Drawing No. 6.0. Size 3/4" or 1"	10	EA	\$ _____	\$ _____
0001AE	Furnish, install, and test Reduced Pressure Zone (RPZ) Device per Dwg. No. 6.0. Size 1 1/4" or 1-1/2".	10	EA	\$ _____	\$ _____
0001AF	Furnish, install, and test Reduced Pressure Zone (RPZ) Device per Drawing No. 6.0. Size 2".	10	EA	\$ _____	\$ _____
0001AG	Furnish, install, and test Reduced Pressure Zone (RPZ) Device per Dwg No. 6.0. Size 2 1/2" or 3".	10	EA	\$ _____	\$ _____
0001AH	Furnish, install, and test Reduced Pressure Zone (RPZ) Device per Drawing No. 6.0. Size 4".	10	EA	\$ _____	\$ _____

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AMENDMENT NO. 0001
BASE YEAR

ITEM	DESCRIPTION	ESTIMATED QUANTITIES	UNIT	UNITS PRICES	ESTIMATED AMOUNTS
0001AJ	Install Reduced Pressure Zone (RPZ) Device per Drawing No. 6.0. Size 6".	10	EA	\$ _____	\$ _____
0001AK	Install Reduced Pressure Zone (RPZ) Device per Drawing No. 6.0. Size 10".	10	EA	\$ _____	\$ _____
0001AL	Relocate existing Reduced Pressure Zone (RPZ) Device per Drawing No. 6.0. Size 3/4" to 1 1/2".	5	EA	\$ _____	\$ _____
0001AM	Furnish and install Double Check Valve Device (DCV) per Drawing No. 5.0. Size 3".	5	EA	\$ _____	\$ _____
0001AN	Furnish and install Double Check Valve Device (DCV) per Drawing No. 5.0. Size 4".	5	EA	\$ _____	\$ _____
0001AP	Furnish and install Flush Valve Vacuum Breaker (FVVB) per Drawing No. 7.0. Size 1-1/4".	2	EA	\$ _____	\$ _____
0001AQ	Furnish and install Vending Machine Backflow Devices (VMBD) per Drawing No. 3.0. Size 1/4" to 3/4".	10	EA	\$ _____	\$ _____
0001AR	Furnish and install Atmospheric Vacuum Breaker (AVB) per Drawing No. 4.0. Size 1/4" to 3/4".	10	EA	\$ _____	\$ _____
0001AS	Furnish and install pipe and supports. Size 3/4" thru 1-1/2".	50	LF	\$ _____	\$ _____

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AMENDMENT NO. 0001
BASE YEAR

ITEM	DESCRIPTION	ESTIMATED QUANTITIES	UNIT	UNITS PRICES	ESTIMATED AMOUNTS
0001AT	Furnish and install fittings (elbows, tees, coupling or nipples), size 3/4" thru 1-1/2".	10	EA	\$ _____	\$ _____
0001AU	Furnish and install stop valve. Size 3/4" thru 1-1/2".	5	EA	\$ _____	\$ _____
0001AV	Furnish and install pipe insulation Size 3/4" thru 1-1/2".	50	LF	\$ _____	\$ _____
0001AW	Furnish and install fitting insulation. Size 3/4" thru 1-1/2".	10	EA	\$ _____	\$ _____
0001AX	Furnish and install pipe and supports. Size 2" thru 3".	50	LF	\$ _____	\$ _____
0001AY	Furnish and install fittings (elbows, tees, coupling or nipples), size 2" thru 3".	60	EA	\$ _____	\$ _____
0001AZ	Furnish and install stop valve. Size 2" thru 3".	5	EA	\$ _____	\$ _____
0001BA	Furnish and install pipe insulation Size 2" thru 3".	50	LF	\$ _____	\$ _____
0001BB	Furnish and install fitting insulation. Size 2" thru 3".	10	EA	\$ _____	\$ _____
0001BC	Furnish and install pipe and supports. Size 4" thru 6".	50	LF	\$ _____	\$ _____
0001BD	Furnish and install fittings (elbows, tees, couplings, nipples, or flanges). Size 4" thru 6".	10	EA	\$ _____	\$ _____
0001BE	Furnish and install stop valve. Size 4" thru 6".	5	EA	\$ _____	\$ _____

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ITEM	DESCRIPTION	ESTIMATED QUANTITIES	UNIT	UNITS PRICES	ESTIMATED AMOUNTS
0001BF	Furnish and install pipe and supports. Size 8" thru 10".	50	LF	\$ _____	\$ _____
0001BG	Furnish and install fittings (elbows, tees, couplings, nipples, or flanges). Size 8" thru 10".	10	EA	\$ _____	\$ _____
0001BH	Furnish and install stop valve. Size 8" thru 10".	5	EA	\$ _____	\$ _____
0001BJ	Furnish and install dielectric union or dielectric flange. Size 3/4" thru 1-1/2".	5	EA	\$ _____	\$ _____
0001BK	Furnish and install dielectric union or dielectric flange. Size 2" thru 3".	5	EA	\$ _____	\$ _____
0001BL	Furnish and install dielectric flanges (Pr.). Size 4" thru 6".	5	EA	\$ _____	\$ _____
0001BM	Furnish and install dielectric flanges (Pr.). Size 8" thru 10".	5	EA	\$ _____	\$ _____
0001BN (AM#1)	Furnish and install above ground valve box with cover. Size for item 0001AD. <u>Per Drawing No. 8.0.</u>	5	EA	\$ _____	\$ _____
0001BP (AM#1)	Furnish and install above ground valve box with cover. Size for item 0001AE. <u>Per Drawing No. 8.0.</u>	5	EA	\$ _____	\$ _____
0001BQ (AM#1)	Furnish and install above ground valve box with cover. Size for item 0001AF. <u>Per Drawing No. 8.0.</u>	5	EA	\$ _____	\$ _____

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AMENDMENT NO. 0001
BASE YEAR

ITEM	DESCRIPTION	ESTIMATED QUANTITIES	UNIT	UNITS PRICES	ESTIMATED AMOUNTS
0001BR (AM#1)	Furnish and install above ground valve box with cover. Size for item 0001AG. <u>Per Drawing No. 8.0.</u>	5	EA	\$ _____	\$ _____
0001BS (AM#1)	Furnish and install above ground valve box with cover. Size for item 0001AH. <u>Per Drawing No. 8.0.</u>	5	EA	\$ _____	\$ _____
0001BT (AM#1)	Furnish and install above ground valve box with cover. Size for item 0001AJ. <u>Per Drawing No. 8.0.</u>	5	EA	\$ _____	\$ _____
0001BU (AM#1)	Furnish and install above ground valve box with cover. Size for item 0001AK <u>Per Drawing No. 8.0.</u>	5	EA	\$ _____	\$ _____
0001BV	Install 8" lever and weight swing check valve.	1	EA	\$ _____	\$ _____
0001BW	Install 10" x 8" MJ reducer.	1	EA	\$ _____	\$ _____
0001BX	Install 8" x 12" MJ solid sleeve.	1	EA	\$ _____	\$ _____
0001BY	Install 10" x 12" MJ solid sleeve.	1	EA	\$ _____	\$ _____
0001BZ	Install 12" x 12" MJ solid sleeve.	1	EA	\$ _____	\$ _____
0001CA	Install 6" x 2" Romac Tapping Saddle.	1	EA	\$ _____	\$ _____
0001CB	Install 6" x 1" Romac Tapping Saddle.	1	EA	\$ _____	\$ _____
0001CC	Temporarily stopple plug the existing 8", 10" and 14" water mains at the Fort Polk water treatment plant	1	EA	\$ _____	\$ _____
0001CD	Install 14" x 15" MJ solid sleeve.	1	EA	\$ _____	\$ _____

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BASE YEAR

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0001CE	Install 6" x 12" MJ solid sleeve.	1	EA	\$	\$
0001CF	Install 4" x 12" MJ solid sleeve.	1	EA	\$	\$
0001CG	Install 2" x 12" MJ solid sleeve.	1	EA	\$	\$
0001CH	Labor and equipment for demolition of existing water main to install new valves per attached Sketch DO-B7279-1.	100	EA	\$	\$
0001CJ	Hourly crew and equipment rate for lost time locating existing valves and utilities.	100	HR	\$	\$
0001CK	Demolition and reconstruction of structures and pavement to gain access to work.	2	YD	\$	\$
0001CL	Clearing, excavation and backfilling.	2	YD	\$	\$
0001CM	Sodding to restore ground cover.	10	YD	\$	\$
0001CN	Perform General Excavation	100	CY	\$	\$
0001CP	Sawcut Existing Concrete Pavement per linear foot per inch thickness	500	LF/IN	\$	\$
0001CQ	Sawcut Existing Asphalt Pavement per linear foot per inch thickness	1000	LF/IN	\$	\$
0001CR	Remove Concrete Curb	25	LF	\$	\$
0001CS	Remove Concrete Curb and Gutter	25	LF	\$	\$
0001CT	Remove Concrete Pavement (1"-10" thick)	15	SY	\$	\$

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ITEM	DESCRIPTION	ESTIMATED QUANTITIES	UNIT	UNITS PRICES	ESTIMATED AMOUNTS
0001CU	Remove Asphalt Pavement (1"-10" thick)	100	SY	\$ _____	\$ _____
0001CV	Remove Concrete Improvements	1000	CF	\$ _____	\$ _____
0001CW	Perform Clearing and Grubbing	1.0	ACRE	\$ _____	\$ _____
0001CX	Remove Tree (6"-12")	1	EA	\$ _____	\$ _____
0001CY	Remove Tree (12"-18")	1	EA	\$ _____	\$ _____
0001CZ	Remove Tree (18"-24")	1	EA	\$ _____	\$ _____
0001DA	Remove Tree (24"-36")	1	EA	\$ _____	\$ _____
0001DB	Remove Tree (1"-6") Near Structure	1	EA	\$ _____	\$ _____
0001DC	Remove Tree (6"-12") Near Structure	1	EA	\$ _____	\$ _____
0001DE	Remove Tree (12"-18") Near Structure	1	EA	\$ _____	\$ _____
0001DF	Remove Tree (18"-24") Near Structure	1	EA	\$ _____	\$ _____
0001DG	Remove Tree (24"-36") Near Structure	1	EA	\$ _____	\$ _____
0001DH	Remove Tree Stumps (6" and larger)	1	EA	\$ _____	\$ _____
0001DJ	Remove Shrubs	5	EA	\$ _____	\$ _____
0001DK	Place and Compact Select Backfill	50	CY	\$ _____	\$ _____
0001DL	Install PVC - Schedule 40 1-1/4 (0-6"deep) In accordance with detail sheet 2	1000	LF	\$ _____	\$ _____

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BASE YEAR

ITEM	DESCRIPTION	ESTIMATED QUANTITIES	UNIT	UNITS PRICES	ESTIMATED AMOUNTS
0001DM	Install PVC - Schedule 40 2" (0-6" deep) In accordance with detail sheet 2	1000	LF	\$ _____	\$ _____
0001DN	Install PVC - C900. Class 150, 4" (0-6' deep) in accordance with detail sheet 2	1000	LF	\$ _____	\$ _____
0001DP	Install PVC - C900. Class 150, 6" (0-6' deep) in accordance with detail sheet 2	3000	LF	\$ _____	\$ _____
0001DQ	Install PVC - C900. Class 150, 8" (0-6' deep) in accordance with detail sheet 2	4000	LF	\$ _____	\$ _____
0001DR	Install PVC - C900. Class 150, 10" (0-6' deep) in accordance with detail sheet 2	500	LF	\$ _____	\$ _____
0001DS	Install PVC - C900. Class 150, 12" (0-6' deep) in accordance with detail sheet 2	500	LF	\$ _____	\$ _____
0001DT	Install PVC - C905. DR 18, 14" (0-6' deep) in accordance with detail sheet 2	500	LF	\$ _____	\$ _____
0001DU	Install 2" Gate Valve. MJ ends In accordance with detail sheet 10	40	EA	\$ _____	\$ _____
0001DV	Install 4" Gate Valve. MJ ends In accordance with detail sheet 10	40	EA	\$ _____	\$ _____
0001DW	Install 6" Gate Valve. MJ ends In accordance with detail sheet 10	40	EA	\$ _____	\$ _____
0001DX	Install 8" Gate Valve. MJ ends In accordance with detail sheet 10	40	EA	\$ _____	\$ _____

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0001DY	Install 10" Gate Valve. MJ ends In accordance with detail sheet 10	20	EA	\$ _____	\$ _____
0001DZ	Install 12" Gate Valve. MJ ends In accordance with detail sheet 10	20	EA	\$ _____	\$ _____
0001EA	Install 14" Gate Valve. MJ ends In accordance with detail sheet 10	5	EA	\$ _____	\$ _____
0001EB	Install 4" C.I. Valve Box with Cover In accordance with detail sheet 19	20	EA	\$ _____	\$ _____
0001EC	Install 6" C.I. Valve Box with Cover In accordance with detail sheet 19	20	EA	\$ _____	\$ _____
0001ED	Install 8" C.I. Valve Box with Cover In accordance with detail sheet 19	20	EA	\$ _____	\$ _____
0001EE	Install 10" C.I. Valve Box with Cover In accordance with detail sheet 19	10	EA	\$ _____	\$ _____
0001EF	Install 12" C.I. Valve Box with Cover In accordance with detail sheet 19	10	EA	\$ _____	\$ _____
0001EG	Install 14" C.I. Valve Box with Cover In accordance with detail sheet 19	5	EA	\$ _____	\$ _____
0001EH	Install 4" C.I. Tapping Sleeve. MJ end In accordance with detail sheet 18	2	EA	\$ _____	\$ _____
0001EJ	Install 6" C.I. Tapping Sleeve. MJ end In accordance with detail sheet 18	2	EA	\$ _____	\$ _____
0001EK	Install 8" X 4" C.I. Tapping Sleeve. MJ end In accordance with detail sheet 18	2	EA	\$ _____	\$ _____

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Solicitation No. DACA63-02-B-0007
AMENDMENT NO. 0001
BASE YEAR

ITEM	DESCRIPTION	ESTIMATED QUANTITIES	UNIT	UNITS PRICES	ESTIMATED AMOUNTS
0001EL	Install 8" X 6" C.I. Tapping Sleeve. MJ end In accordance with detail sheet 18	2	EA	\$ _____	\$ _____
0001EM	Install 8" C.I. Tapping Sleeve. MJ end In accordance with detail sheet 18	2	EA	\$ _____	\$ _____
0001EN	Install 10" X 4" C.I. Tapping Sleeve. MJ end In accordance with detail sheet 18	2	EA	\$ _____	\$ _____
0001EP	Install 10" X 6" C.I. Tapping Sleeve. MJ end In accordance with detail sheet 18	2	EA	\$ _____	\$ _____
0001EQ	Install 10" X 8" C.I. Tapping Sleeve. MJ end In accordance with detail sheet 18	2	EA	\$ _____	\$ _____
0001ER	Install 10" C.I. Tapping Sleeve. MJ end In accordance with detail sheet 18	2	EA	\$ _____	\$ _____
0001ES	Install 12" X 4" C.I. Tapping Sleeve. MJ end In accordance with detail sheet 18	2	EA	\$ _____	\$ _____
0001ET	Install 12" X 6" C.I. Tapping Sleeve. MJ end In accordance with detail sheet 18	2	EA	\$ _____	\$ _____
0001EU	Install 12" X 8" C.I. Tapping Sleeve. MJ end In accordance with detail sheet 18	2	EA	\$ _____	\$ _____
0001EV	Install 12" X 10" C.I. Tapping Sleeve. MJ end In accordance with detail sheet 18	2	EA	\$ _____	\$ _____

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0001EW	Install 12" C.I. Tapping Sleeve. MJ end In accordance with detail sheet 18	2	EA	\$ _____	\$ _____
0001EX	Install 14" X 4" C.I. Tapping Sleeve. MJ end In accordance with detail sheet 18	1	EA	\$ _____	\$ _____
0001EY	Install 14" X 6" C.I. Tapping Sleeve. MJ end In accordance with detail sheet 18	1	EA	\$ _____	\$ _____
0001EZ	Install 14" X 8" C.I. Tapping Sleeve. MJ end In accordance with detail sheet 18	1	EA	\$ _____	\$ _____
0001FA	Install 14" X 10" C.I. Tapping Sleeve. MJ end In accordance with detail sheet 18	1	EA	\$ _____	\$ _____
0001FB	Install 14" X 12" C.I. Tapping Sleeve. MJ end In accordance with detail sheet 18	1	EA	\$ _____	\$ _____
0001FC	Install 14" C.I. Tapping Sleeve. MJ end In accordance with detail sheet 18	1	EA	\$ _____	\$ _____
0001FD	Install 4" Tapping Valve In accordance with detail sheet 18	2	EA	\$ _____	\$ _____
0001FE	Install 6" Tapping Valve In accordance with detail sheet 18	2	EA	\$ _____	\$ _____
0001FF	Install 8" Tapping Valve In accordance with detail sheet 18	2	EA	\$ _____	\$ _____
0001FG	Install 10" Tapping Valve In accordance with detail sheet 18	2	EA	\$ _____	\$ _____

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0001FH	Install 12" Tapping Valve In accordance with detail sheet 18	2	EA	\$ _____	\$ _____
0001FJ	Install 14" Tapping Valve In accordance with detail sheet 18	2	EA	\$ _____	\$ _____
0001FK	Install 4" MJ Tee	2	EA	\$ _____	\$ _____
0001FL	Install 6" MJ Tee	2	EA	\$ _____	\$ _____
0001FM	Install 8" MJ Tee	2	EA	\$ _____	\$ _____
0001FN	Install 10" MJ Tee	1	EA	\$ _____	\$ _____
0001FP	Install 12" MJ Tee	1	EA	\$ _____	\$ _____
0001FQ	Install 14" MJ Tee	1	EA	\$ _____	\$ _____
0001FR	Install 2" MJ. 45 degree bend	25	EA	\$ _____	\$ _____
0001FS	Install 4" MJ. 45 degree bend	10	EA	\$ _____	\$ _____
0001FT	Install 6" MJ. 45 degree bend	15	EA	\$ _____	\$ _____
0001FU	Install 8" MJ. 45 degree bend	15	EA	\$ _____	\$ _____
0001FV	Install 10" MJ. 45 degree bend	2	EA	\$ _____	\$ _____
0001FW	Install 12" MJ. 45 degree bend	10	EA	\$ _____	\$ _____
0001FX	Install 14" MJ. 45 degree bend	2	EA	\$ _____	\$ _____
0001FY	Install 2" MJ. 90 degree bend	25	EA	\$ _____	\$ _____
0001FZ	Install 4" MJ. 90 degree bend	10	EA	\$ _____	\$ _____
0001GA	Install 6" MJ. 90 degree bend	15	EA	\$ _____	\$ _____
0001GB	Install 8" MJ. 90 degree bend	15	EA	\$ _____	\$ _____

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0001GC	Install 10" MJ. 90 degree bend	2	EA	\$	\$
0001GD	Install 12" MJ. 90 degree bend	10	EA	\$	\$
0001GE	Install 14" MJ. 90 degree bend	2	EA	\$	\$
0001GF	Install Fire Hydrant Assembly In accordance with detail sheet 9	2	EA	\$	\$
0001GG	Install Post Indicator Assembly In accordance with detail sheet 10	2	EA	\$	\$
0001GH	Install 3/4" Corporation Stop	2	EA	\$	\$
0001GJ	Install 1" Corporation Stop	2	EA	\$	\$
0001GK	Install 1 1/2" Corporation stop	2	EA	\$	\$
0001GL	Install 2" Corporation Stop	2	EA	\$	\$
0001GM	Install 3/4" Curb Stop	2	EA	\$	\$
0001GN	Install 1" Curb Stop	2	EA	\$	\$
0001GP	Install 1 1/2" Curb Stop	2	EA	\$	\$
0001GQ	Install 2" Curb Stop	2	EA	\$	\$
0001GR	Install Water Meter Box with Cover	20	EA	\$	\$
0001GS	Install 2" PVC to MJ Restrainer	5	EA	\$	\$
0001GT	Install 4" PVC to MJ Restrainer	5	EA	\$	\$
0001GU	Install 6" PVC to MJ Restrainer	5	EA	\$	\$
0001GV	Install 8" PVC to MJ Restrainer	5	EA	\$	\$
0001GW	Install 10" PVC to MJ Restrainer	2	EA	\$	\$

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ITEM	DESCRIPTION	ESTIMATED QUANTITIES	UNIT	UNITS PRICES	ESTIMATED AMOUNTS
0001GX	Install 12" PVC to MJ Restrainer	2	EA	\$ _____	\$ _____
0001GY	Install 14" PVC to MJ Restrainer	2	EA	\$ _____	\$ _____
0001GZ	Install 8" Bollard In accordance with detail sheet 13	3	EA	\$ _____	\$ _____
0001HA	Install 6 " Bollard In accordance with detail sheet 13	2	EA	\$ _____	\$ _____
0001HB	Install 4" Bollard In accordance with detail sheet 13	2	EA	\$ _____	\$ _____
0001HC	Install 2" Bollard In accordance with detail sheet 13	2	EA	\$ _____	\$ _____
0001HD	Place 12" Thick Concrete Paving base for Asphalt In accordance with detail sheet 4	30	CY	\$ _____	\$ _____
0001HE	Place Asphaltic Concrete Paving In accordance with detail sheet 4	40	TON	\$ _____	\$ _____
0001HF	Place Concrete Paving In accordance with detail sheet 5	80	CY	\$ _____	\$ _____
0001HG	Install 2" Blow Off Assembly (Meter Box Option) In accordance with detail sheet 24	2	EA	\$ _____	\$ _____
0001HH	Install 2" Blow Off Assembly. Valve Box Option In accordance with detail sheet 23	2	EA	\$ _____	\$ _____
0001HJ	Perform 4" Dry Bore W/PVC	45	LF	\$ _____	\$ _____
0001HK	Perform 6" Dry Bore W/PVC	45	LF	\$ _____	\$ _____
0001HL	Perform 8" Dry Bore W/PVC	45	LF	\$ _____	\$ _____

BIDDING SCHEDULE
(To Be Attached to SF 1442)

Requirements Contract For Repair and Installation of Water Distribution Lines
Joint Readiness Training Center and Fort Polk
Fort Polk, Louisiana
Solicitation No. DACA63-02-B-0007
AMENDMENT NO. 0001
BASE YEAR

ITEM	DESCRIPTION	ESTIMATED QUANTITIES	UNIT	UNITS PRICES	ESTIMATED AMOUNTS
0001HM	Perform 10" Dry Bore W/PVC	45	LF	\$ _____	\$ _____
0001HN	Perform 12" Dry Bore W/PVC	45	LF	\$ _____	\$ _____
0001HP	Perform 14" Dry Bore W/PVC	45	LF	\$ _____	\$ _____
0001HQ	Perform 12" Steel Casing Bore with 4 "PVC In accordance with detail sheet 21	45	LF	\$ _____	\$ _____
0001HR	Perform 14" Steel Casing Bore with 6" PVC In accordance with detail sheet 21	45	LF	\$ _____	\$ _____
0001HS	Perform 16" Steel Casing Bore with 8" PVC In accordance with detail sheet 21	45	LF	\$ _____	\$ _____
0001HT	Perform 18" Steel Casing Bore with 10" PVC In accordance with detail sheet 21	45	LF	\$ _____	\$ _____
0001HU	Perform 20" Steel Casing Bore with 12" PVC In accordance with detail sheet 21	45	LF	\$ _____	\$ _____
0001HV	Perform 22" Steel Casing Bore with 14" PVC In accordance with detail sheet 21	45	LF	\$ _____	\$ _____
0001HW	Replace fire Hydrant In accordance with detail sheet 9	5	EA	\$ _____	\$ _____
0001HX	Replace Plug and Abandon Existing Water Line (all sizes)	25	EA	\$ _____	\$ _____
0001HY	Construct Concrete Encasement of Existing Sewer Line In accordance with detail sheets 7&8	40	LF	\$ _____	\$ _____

BIDDING SCHEDULE
(To Be Attached to SF 1442)

Requirements Contract For Repair and Installation of Water Distribution Lines
Joint Readiness Training Center and Fort Polk
Fort Polk, Louisiana
Solicitation No. DACA63-02-B-0007
AMENDMENT NO. 0001
BASE YEAR

ITEM	DESCRIPTION	ESTIMATED QUANTITIES	UNIT	UNITS PRICES	ESTIMATED AMOUNTS
0001HZ	Install Automatic Air Release Valve In accordance with detail sheet 25	1	EA	\$ _____	\$ _____
0001JA	Install Air Vacuum Valve Assembly In accordance with detail sheet 26	1	EA	\$ _____	\$ _____
0001JB	Install Manual Air Release Valve In accordance with detail sheet 27	1	EA	\$ _____	\$ _____
0001JC	Sodding Payment includes materials, labor or other items necessary to establish a complete turf or solid sod over the identified area. Payment shall also include any fertilizing, watering, or mowing required by the specificaitons to to maintain the turf until project completion. The bid item shall be per square yard of accepted turf.	50	SY	\$ _____	\$ _____
0001JD	Seeding and Fertilizing Payment shall include all labor, equipment and materials to establish cover growth by seeding. The bid item item shall include all fertilizing, reseeding or reworking areas within the project area such that grass cover has been established. The bid item shall be per square yard of accepted seeded area.	50	SY	\$ _____	\$ _____

BIDDING SCHEDULE
(To Be Attached to SF 1442)

Requirements Contract For Repair and Installation of Water Distribution Lines
Joint Readiness Training Center and Fort Polk
Fort Polk, Louisiana
Solicitation No. DACA63-02-B-0007
AMENDMENT NO. 0001
BASE YEAR

ITEM	DESCRIPTION	ESTIMATED QUANTITIES	UNIT	UNITS PRICES	ESTIMATED AMOUNTS
0002	Performance and Payment Bonding				
0002AA	Initial Bonding '(Performance Bond - \$1,000,000 Payment Bond - \$1,000,000	1000	1K	\$	\$

TOTAL BID (BASE YEAR) \$

0003 The monetary value for warranty work is established at 1 percent of the amount awarded for construction. See the Contract Specifications Section 01770 TASK ORDER AND CONTRACT CLOSEOUT, paragraph "Contractor's Response to Construction Warranty Service Requirements."

BIDDING SCHEDULE (cont)

NOTES:

1. ARITHMETIC DISCREPANCIES (EFARS 14.407-2)

(a) For the purpose of initial evaluation of bids, the following will be utilized in resolving arithmetic discrepancies found on the face of the bidding schedule as submitted by bidders:

- (1) Obviously misplaced decimal points will be corrected;
- (2) Discrepancy between unit price and extended price, the unit price will govern;
- (3) Apparent errors in extension of unit prices will be corrected;
- (4) Apparent errors in addition of lump-sum and extended prices will be corrected.

(b) For the purposes of bid evaluation, the Government will proceed on the assumption that the bidder intends his bid to be evaluated on the basis of the unit prices, the totals arrived at by resolution of arithmetic discrepancies as provided above and the bid will be so reflected on the abstract of bids.

(c) These correction procedures shall not be used to resolve any ambiguity concerning which bid is low.

2. If a modification to a bid based on unit prices is submitted, which provides for a lump sum adjustment to the total estimated cost, the application of the lump sum adjustment to each unit price in the bid schedule must be stated. If it is not stated, the bidder agrees that the lump sum adjustment shall be applied on a pro rata basis to every unit price in the bid schedule.

3. Bidders must bid on all items.

4. Responders are advised that this requirement may be delayed, cancelled or revised at any time during the solicitation, selection, evaluation, negotiation and/or final award process based on decisions related to DOD changes in force structure and disposition of the Armed Forces.

5. For the purpose of this solicitation, the word "item" shall be considered to mean "schedule" as used in Provision 52.214-0019, CONTRACT AWARD--SEALED BIDDING--CONSTRUCTION, in Section 00100 INSTRUCTIONS, CONDITIONS, AND NOTICES TO BIDDERS, excluding additives, deductives, or optional items.

6. This requirement will result in a base period with two (2) option periods, not to exceed 36 months from the date of the contract award. The base period will consist of 365 days, option period one (1) will consist of 365 days and option two (2) will consist of 365 days. The base year contract amount shall not exceed an estimated \$1,000,000; each option year shall not exceed an estimated \$1,000,000. The total contract amount for the three years is estimated not to exceed \$3,000,000.

END OF BIDDING SCHEDULE

SECTION 02070 - SELECTIVE DEMOLITION

PART

1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section requires the selective removal and subsequent offsite disposal of the following:
 - 1. Portions of existing items indicated on drawings and as required to accommodate new construction.
 - 2. Removal and protection of existing fixtures, materials, and equipment items indicated "salvage."
 - 3. Portions of existing improvements identified on drawings shall be removed and properly disposed of as directed by the Contracting Officer's Representative.
- B. Related work specified elsewhere:
 - 1. Demolition work is identified on associated drawings regarding new water system installations.
 - 2. Disposal of materials shall be in an approved area and as directed by the Contracting Officer's Representative.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Schedule indicating proposed sequence of operations for selective demolition work to Contracting Officer's Representative for review prior to start of work. Include coordination for shutoff, capping, and continuation of utility services as required, together with details for dust and noise control protection.
 - 1. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Government's on-site operations.
 - 2. Coordinate with Contracting Officer's Representative prior to demolition in areas currently being used.
- C. Photographs of existing conditions of structure surfaces, equipment, and adjacent improvements that might be misconstrued as damage related to removal operations. File with Contracting Officer's Representative prior to start of work.

1.4 JOB CONDITIONS

- A. Occupancy: Government will occupy portions of the site immediately adjacent to areas of selective demolition. Conduct selective demolition work in manner that will minimize need for disruption of Government's normal operations. Provide minimum of 72 hours advance notice to Government of demolition activities that will affect Government's normal operations.
- B. Condition of Structures: Government assumes no responsibility for actual condition of items or structures to be demolished.
 - 1. Conditions existing at time of inspection for bidding purposes will be maintained by Government insofar as practicable. However, minor variations within structure may occur by Government's removal and salvage operations prior to start of selective demolition work.
- C. Partial Demolition and Removal: Items indicated to be removed but of salvageable value to Contractor may be removed from site as work progresses. Transport salvaged items from site as they are removed.
 - 1. Storage or sale of removed items on site will not be permitted.
- D. Protections: Provide temporary barricades and other forms of protection to protect Government's personnel and general public from injury due to selective demolition work.
 - 1. Provide protective measures as required to provide free and safe passage of Government's personnel and general public to occupied portions of area.
 - 2. Erect temporary covered passageways as required by Contracting Officer's Representative.
 - 3. Provide any/all necessary protective support to prevent movement, settlement, or collapse of structure or

- element to be demolished and adjacent facilities or work to remain.
 - 4. Protect from damage existing system that is to remain in place and becomes exposed during demolition operations.
 - 5. Provide protection in construction area during demolition and construction phase to ensure that no damage to the system occurs due to exposure to inclement weather conditions.
 - 6. Remove protections at completion of work.
- E. Damages: Promptly repair damages caused to adjacent facilities by demolition work.
- F. Traffic: Conduct selective demolition operations and debris removal to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
 - 1. Do not close, block, or otherwise obstruct streets, walks, or other occupied or used facilities without written permission from Contracting Officer's Representative. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- G. Flame Cutting: Do not use cutting torches for removal until work area is cleared of flammable materials. Maintain portable fire suppression devices during flame-cutting operations.
- H. Utility Services: Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.
 - 1. Do not interrupt utilities serving occupied or used facilities, except when authorized in writing by Contracting Officer's Representative. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.
 - 2. Maintain fire protection services during selective demolition operations.
- I. Environmental Controls: Use water sprinkling, temporary enclosures, and other methods to limit dust and dirt migration. Comply with governing regulations pertaining to environmental protection.
 - 1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 PREPARATION

- A. General: Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of areas to be demolished and adjacent facilities to remain.
 - 1. Cease operations and notify Contracting Officer's Representative immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.
 - 2. Locate, identify, stub off, and disconnect utility services that are not indicated to remain.
 - a. Provide bypass connections as necessary to maintain continuity of service to occupied areas of building. Provide minimum of 72 hours advance notice to Contracting Officer's Representative if shutdown of service is necessary during changeover.

3.2 DEMOLITION

- A. General: Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with demolition schedule and governing regulations.
 - 1. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools; do not use power-driven impact tools.
 - 2. Provide services for effective air and water pollution controls as required by local Contracting Officer's Representative.
 - 3. Completely fill below-grade areas and voids resulting from demolition work. Provide fill consisting of approved earth, gravel, or sand, free of trash and debris, stones over 6 inches in diameter, roots, or other organic matter.
- B. If unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Contracting Officer's Representative in written, accurate detail. Pending receipt of directive from Contracting Officer's Representative, rearrange selective demolition schedule as necessary to continue overall job progress without undue delay.

3.3 SALVAGED MATERIALS

- A. Salvaged Items: Where indicated on Drawings as "Salvage - Deliver to Contracting Officer's Representative," carefully remove indicated items, clean, store, and turn over to Government and obtain receipt.
 - 1. Historic artifacts, including cornerstones and their contents, commemorative plaques and tablets, antiques, and other articles of historic significance, remain property of Government. Notify Contracting Officer's Representative if such items are encountered and obtain acceptance regarding method of removal and salvage for Government.

3.4 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove from building site debris, rubbish, and other materials resulting from demolition operations. Transport and legally dispose of off-site as directed.
 - 1. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.
 - 2. Burning of removed materials is not permitted on project site.

3.5 CLEANUP AND REPAIR

- A. General: Upon completion of demolition work, remove tools, equipment, and demolished materials from site. Remove protections and leave interior areas broom clean.
 - 1. Repair demolition performed in excess of that required. Return elements of construction and surfaces to remain to condition existing prior to start of operations. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

END OF SECTION 02070

SECTION 02110 - SITE CLEARING

PART

1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Protection of existing trees indicated to remain.
 - 2. Removal of trees and other vegetation.
 - 3. Topsoil stripping.
 - 4. Clearing and grubbing.
 - 5. Removing above-grade improvements.
 - 6. Removing below-grade improvements.
 - 7. Saw-cutting of existing edges of pavement.

1.3 PROJECT CONDITIONS

- A. Traffic: Conduct site-clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks, or other occupied or used facilities without permission from the Contracting Officer's Representative.
- B. Protection of Existing Improvements: Provide protections necessary to prevent damage to existing improvements indicated to remain in place.
 - 1. Protect improvements on adjoining properties and on Government's property.
 - 2. Restore damaged improvements to their original condition, as acceptable to property Governments.
- C. Protection of Existing Trees and Vegetation: Protect existing trees and other vegetation indicated to remain in place against unnecessary cutting, breaking or skinning of roots, skinning or bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary guards to protect trees and vegetation to be left standing.
 - 1. Water trees and other vegetation to remain within limits of contract work as required to maintain their health during course of construction operations.
 - 2. Provide protection for roots over 1-1/2 inch in diameter that are cut during construction operations. Coat cut faces with an emulsified asphalt or other acceptable coating formulated to use on damaged plant tissues. Temporarily cover exposed roots with wet burlap to prevent roots from drying out; cover with earth as soon as possible.
 - 3. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations in a manner acceptable to Contracting Officer's Representative. Employ a licensed arborist to repair damage to trees and shrubs.
 - 4. Replace trees that cannot be repaired and restored to full-growth status, as determined by arborist.
- D. Improvements on Adjoining Property: Authority for performing removal and alteration work on property adjoining Government's property will be obtained by Contracting Officer's Representative prior to award of contract.
 - 1. Extent of work on adjacent property is as directed by the Contracting Officer's Representative.

1.4 EXISTING SERVICES

- A. General: Indicated locations are approximate; determine exact locations before commencing Work.
- B. Arrange and pay for disconnecting, removing, capping, and plugging utility services. Notify Contracting Officer's Representative in advance and obtain approval before starting this Work.
- C. Place markers to indicate location of disconnected services. Identify service lines and capping locations on Project Record Documents.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 SITE CLEARING

- A. General: Remove trees, shrubs, grass, and other vegetation, improvements, or obstructions, as required, to permit installation of new construction. Remove similar items elsewhere on site or premises as specifically indicated. Removal includes digging out and off-site disposal of stumps and roots.
 - 1. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
- B. Topsoil: Topsoil is defined as friable clay loam surface soil found in a depth of not less than 4 inches. Acceptable topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2 inches in diameter, and without weeds, roots, and other objectionable material.
 - 1. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material. Remove heavy growths of grass from areas before stripping.
 - a. Where existing trees are indicated to remain, leave existing topsoil in place within drip lines to prevent damage to root system.
 - 2. Stockpile topsoil in storage piles in areas indicated or directed. Construct storage piles to provide free drainage of surface water. Cover storage piles, if required, to prevent wind erosion.
 - 3. Dispose of unsuitable or excess topsoil as specified for disposal of waste material.
- C. Clearing and Grubbing: Clear site of trees, shrubs, and other vegetation, except for those indicated to be left standing.
 - 1. Completely remove stumps, roots, and other debris protruding through ground surface.
 - 2. Use only hand methods for grubbing inside drip line of trees indicated to remain.
 - 3. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
 - a. Place fill material in horizontal layers not exceeding 6 inches loose depth, and thoroughly compact each layer to a density equal to adjacent original ground.
- D. Removal of Improvements: Remove existing above-grade and below-grade improvements as indicated and as necessary to facilitate new construction.
 - 1. Abandonment or removal of certain underground pipe or conduits may be indicated on drawings and is included as part of this contract. Removing abandoned underground piping or conduits interfering with construction is included under this Section.
- E. Sawcutting: Sawcut existing pavement edges to neat lines as directed. The sawcuts shall be made to full depth to prevent uneven or misaligned joints.

3.2 DISPOSAL OF WASTE MATERIALS

- A. Burning on Government's Property: Burning is not permitted on Government's property.
- B. Removal from Government's Property: Remove waste materials and unsuitable or excess topsoil from Government's property.

END OF SECTION 02110

SECTION 02160 - EXCAVATION SUPPORT SYSTEMS

PART

1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes, but is not limited to, the following:
 - 1. Shoring and bracing necessary to protect existing buildings, streets, walkways, utilities, and other improvements and excavation against loss of ground or caving embankments.
 - 2. Maintenance of shoring and bracing.
 - 3. Removal of shoring and bracing, as required.
- B. Types of shoring and bracing systems include, but are not limited to, the following:
 - 1. Steel H-section (soldier) piles.
 - 2. Timber lagging.
 - 3. Steel sheet piles.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Layout drawings for excavation support system and other data prepared by, or under the supervision of, a qualified professional engineer. System design and calculations must be acceptable to the Contracting Officer's Representative.

1.4 QUALITY ASSURANCE

- A. Engineer Qualifications: A professional engineer legally authorized to practice in Louisiana, and experienced in providing successful engineering services for excavation support systems similar in extent required for this Project.
- B. Regulations: Comply with codes and ordinances of governing authorities having jurisdiction.

1.5 JOB CONDITIONS

- A. Before starting work, verify governing dimensions and elevations. Verify condition of adjoining properties. Take photographs to record any existing settlement or cracking of structures, pavements, and other improvements. Prepare a list of such damages, verified by dated photographs, and signed by Contractor and others conducting investigation.
- B. During excavation, monitor adjacent buildings, maintaining accurate log of field data for comparison with original conditions. Promptly notify Contracting Officer's Representative if changes in conditions occur or if cracks, sags, or other damage is evident.

1.6 EXISTING UTILITIES

- A. Locations of existing utilities are approximate and the contractor shall be responsible for locating the exact horizontal and vertical position of all existing utilities before beginning work.
- B. Protect existing active sewer, water, gas, electricity and other utility services and structures.
- C. Comply with requirements of governing authorities and agencies for protection, relocation, removal, and discontinuing of services.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide adequate shoring and bracing materials which will support loads imposed. Materials need not be new, but should be in serviceable condition.
- B. Structural Steel: ASTM A 36.

- C. Steel Sheet Piles: ASTM A 328.
- D. Timber Lagging: Any species, rough-cut, mixed hardwood, nominal 3 inches thick, unless otherwise indicated.

PART 3 - EXECUTION

3.1 SHORING

- A. Wherever shoring is required, locate the system to clear permanent construction and to permit forming and finishing of concrete surfaces. Provide shoring system adequately anchored and braced to resist earth and hydrostatic pressures.
- B. Shoring systems retaining earth on which the support or stability of existing structures is dependent must be left in place at completion of work.

3.2 BRACING

- A. Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move a brace, install new bracing prior to removal of original brace.
- B. Do not place bracing where it will be cast into or included in permanent concrete work, except as otherwise acceptable to Contracting Officer's Representative.
- C. Install internal bracing, if required, to prevent spreading or distortion of braced frames.
- D. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.
- E. Remove sheeting, shoring, and bracing in stages to avoid disturbance to underlying soils and damage to structures, pavements, facilities, and utilities.
- F. Repair or replace, as acceptable to Contracting Officer's Representative, adjacent work damaged or displaced through installation or removal of shoring and bracing work.

END OF SECTION 02160

SECTION 02200 - EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Preparing of subgrade for slabs, walks, and other pavements.
 - 2. Drainage fill course for support of slabs is included as part of this work.
 - 3. Excavating and backfilling of trenches for utilities and other improvements.
 - 4. Excavating and backfilling for underground mechanical and electrical utilities and buried mechanical and electrical appurtenances.
- B. Final Grading, together with placement and preparation of topsoil for lawns and planting, is specified in Division 2 Section, "Landscape Work."

1.3 DEFINITIONS

- A. Excavation consists of removal of material encountered to elevations, as coordinated with and directed by the Contracting Officer's Representative for removal, and subsequent disposal of materials removed.
- B. Unauthorized excavation consists of removal of materials beyond indicated elevations or dimensions without specific direction of Contracting Officer's Representative. Unauthorized excavation, as well as remedial work directed by Contracting Officer's Representative, shall be at Contractor's expense.
 - 1. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to Contracting Officer's Representative.
 - 2. In locations other than those above, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Contracting Officer's Representative.
- C. Additional Excavation: When excavation has reached required elevations, notify Contracting Officer's Representative, who will make an inspection of conditions. If Contracting Officer's Representative determines that bearing materials at required subgrade elevations are unsuitable, continue excavation until suitable bearing materials are encountered and replace excavated material as directed by Contracting Officer's Representative. The Contract Sum may be adjusted by an appropriate Contract Modification.
 - 1. Removal of unsuitable material and its replacement as directed will be paid on basis of Conditions of the Contract relative to changes in work.
- D. Subgrade: The undisturbed earth or the compacted soil layer immediately below granular subbase, drainage fill, or topsoil materials.
- E. Structure: Buildings, foundations, slabs, tanks, curbs, or other man-made stationary features occurring above or below ground surface.

1.4 SUBMITTALS

- A. Test Reports: Submit the following reports directly to Contracting Officer's Representative from the testing services, with copy to Contractor:
 - 1. Test reports on borrow material.
 - 2. Field reports; in-place soil density tests.
 - 3. One optimum moisture-maximum density curve for each type of soil encountered.
 - 4. Report of actual unconfined compressive strength and/or results of bearing tests of each strata tested.

1.5 QUALITY ASSURANCE

- A. Codes and Standards: Perform excavation work in compliance with all applicable code requirements.

- B. Testing and Inspection Service: Contractor will employ and pay for a qualified independent geotechnical testing and inspection laboratory to perform soil testing and inspection service during earthwork operations.
- C. Testing Laboratory Qualifications: To qualify for acceptance, the geotechnical testing laboratory must demonstrate to Contracting Officer's Representative's satisfaction, based on evaluation of laboratory-submitted criteria conforming to ASTM E 699, that it has the experience and capability to conduct required field and laboratory geotechnical testing without delaying the progress of the Work.

1.6 PROJECT CONDITIONS

- A. Site Information: Data in subsurface investigation reports was used for the basis of the design and are available to the Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity. The Government will not be responsible for interpretations or conclusions drawn from this data by Contractor.
 - 1. Test borings and other exploratory operations may be performed by Contractor, at the Contractor's option; however, no change in the Contract Sum will be authorized for such additional exploration.
- B. Existing Utilities: Locate existing underground utilities in areas of excavation work. If utilities are indicated to remain in place, provide adequate means of support and protection during earthwork operations.
 - 1. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult Contracting Officer's Representative immediately for directions. Cooperate with Government in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of Contracting Officer's Representative.
 - 2. Do not interrupt existing utilities serving facilities occupied by Government or others, during occupied hours, except when permitted in writing by Contracting Officer's Representative and then only after acceptable temporary utility services have been provided.
 - a. Provide minimum of 72-hour notice to Contracting Officer's Representative, and receive written notice to proceed before interrupting any utility.
 - 3. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with Contracting Officer's Representative for shutoff of services if lines are active.
- C. Use of Explosives: Use of explosives is not permitted.
- D. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.
 - 1. Operate warning lights as recommended by Contracting Officer's Representative.
 - 2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
 - 3. Perform excavation by hand within drip line of large trees to remain. Protect root systems from damage or dryout to the greatest extent possible. Maintain moist condition for root system and cover exposed roots with moistened burlap.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Satisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups GW, GP, GM, SM, SW, and SP.
- B. Unsatisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT.
- C. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, and natural or crushed sand.
- D. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, with 100 percent passing a 1-1/2 inch sieve and not more than 5 percent passing a No. 4 sieve.
- E. Backfill and Fill Materials: Satisfactory soil materials free of clay, rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation and other deleterious matter.

PART 3 - EXECUTION

3.1 EXCAVATION

- A. Excavation is unclassified and includes excavation to elevations indicated, regardless of character of materials and obstructions encountered.
- B. Excavation Classifications: The following classifications of excavation will be made when rock is encountered:
 - 1. Earth Excavation includes excavation of pavements and other obstructions visible on surface; underground structures, utilities, and other items indicated to be demolished and removed; together with earth and other materials encountered that are not classified as rock or unauthorized excavation.
 - 2. Rock excavation for trenches and pits includes removal and disposal of materials and obstructions encountered that cannot be excavated with a track-mounted power excavator, equivalent to Caterpillar Model No. 215C LC, and rated at not less than 115 HP flywheel power and 32,000-pound drawbar pull and equipped with a short stick and a 42-inch wide, short tip radius rock bucket rated at 0.81 cubic yard (heaped) capacity. Trenches in excess of 10 feet in width and pits in excess of 30 feet in either length or width are classified as open excavation.
 - 3. Rock excavation in open excavations includes removal and disposal of materials and obstructions encountered that cannot be dislodged and excavated with modern, track-mounted, heavy-duty excavating equipment without drilling, blasting, or ripping. Rock excavation equipment is defined as Caterpillar Model No. 973 or equivalent track-mounted loader, rated at not less than 210 HP flywheel power and developing minimum of 45,000-pound breakout force (measured in accordance with SAE J732).
 - a. Typical of materials classified as rock are boulders 1/2 cu. yd. or more in volume, solid rock, rock in ledges, and rock-hard cementitious aggregate deposits.
 - b. Intermittent drilling, or ripping performed to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation.
- C. Do not perform rock excavation work until material to be excavated has been cross-sectioned and classified by Contracting Officer's Representative. Such excavation will be paid on basis of Contract Conditions relative to changes in work.
- D. Rock payment lines are limited to the following:
 - 1. Two feet outside of concrete work for which forms are required, except footings.
 - 2. One foot outside perimeter of footings.
 - 3. In pipe trenches, 6 inches below invert elevation of pipe and 2 feet wider than inside diameter of pipe, but not less than 3 feet minimum trench width.
 - 4. Outside dimensions of concrete work where no forms are required.
 - 5. Under slabs on grade, 6 inches below bottom of concrete slab.

3.2 STABILITY OF EXCAVATIONS

- A. General: Comply with all codes and ordinances, during work.
- B. Slope sides of excavations to comply with local codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.
- C. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross braces, in good serviceable condition. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Extend shoring and bracing as excavation progresses.
 - 1. Provide permanent steel sheet piling or pressure-treated timber sheet piling wherever subsequent removal of sheet piling might permit lateral movement of soil under adjacent structures. Cut off tops a minimum of 2'-6" below final grade and leave permanently in place.

3.3 DEWATERING

- A. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.
 - 1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting of footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
 - 2. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches.

3.4 STORAGE OF EXCAVATED MATERIALS

- A. Stockpile excavated materials acceptable for backfill and fill where directed. Place, grade, and shape stockpiles for proper drainage.
 - 1. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.
 - 2. Dispose of excess excavated soil material and materials not acceptable for use as backfill or fill.

3.5 EXCAVATION FOR PAVEMENTS

- A. Cut surface under pavements to comply with cross-sections, elevations and grades as indicated.

3.6 TRENCH EXCAVATION FOR PIPES AND CONDUIT

- A. Excavate trenches to uniform width, sufficiently wide to provide ample working room and a minimum of 9 inches of clearance on both sides of pipe or conduit.
- B. Excavate trenches and conduit to depth indicated and to support bottom of pipe or conduit on undisturbed soil. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
 - 1. Where rock is encountered, carry excavation 6 inches below required elevation and backfill with a 6-inch layer of crushed stone or gravel prior to installation of pipe.
 - 2. For pipes or conduit less than 6 inches in nominal size, and for flat-bottomed, multiple-duct conduit units, do not excavate beyond indicated depths. Hand-excavate bottom cut to accurate elevations and support pipe or conduit on undisturbed soil.
 - 3. For pipes and equipment 6 inches or larger in nominal size, shape bottom of trench to fit bottom of pipe for 90 degrees (bottom 1/4 of the circumference). Fill depressions with tamped sand backfill. At each pipe joint, dig bell holes to relieve the bells of all loads and to ensure continuous bearing of pipe barrel on bearing surface.

3.7 COLD WEATHER PROTECTION

- A. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees Fahrenheit.

3.8 BACKFILL AND FILL

- A. General: Place soil material in layers to required subgrade elevations, for each area classification listed below, using materials specified in Part 2 of this Section.
 - 1. Under grassed areas, use satisfactory excavated or borrow material.
 - 2. Under walks and pavements, use subbase material, satisfactory excavated or borrow material, or a combination.
 - 3. Under piping and conduit and equipment, use subbase materials where required over rock bearing surface and for correction of unauthorized excavation. Shape excavation bottom to fit bottom 90 degrees of cylinder.
 - 4. Backfill trenches with concrete where trench excavations pass within 18 inches of column or wall footings and that are carried below bottom of such footings or that pass under wall footings. Place concrete to level of bottom of adjacent footing.
 - a. Concrete is specified in Division 3.
 - b. Do not backfill trenches until tests and inspections have been made and backfilling is authorized by Contracting Officer's Representative. Use care in backfilling to avoid damage or displacement of pipe systems.
 - 5. Provide 4-inch-thick concrete base slab support for piping or conduit less than 2'-6" below surface of roadways. After installation and testing of piping or conduit, provide minimum 4-inch-thick encasement (sides and top) of concrete prior to backfilling or placement of roadway subbase.
- B. Backfill excavations as promptly as work permits, but not until completion of the following:
 - 1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
 - 2. Inspection, testing, approval, and recording locations of underground utilities have been performed and recorded.
 - 3. Removal of concrete formwork.
 - 4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.
 - 5. Removal of trash and debris from excavation.

6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

3.9 PLACEMENT AND COMPACTION

- A. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.
 1. When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.
- B. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- C. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
- D. Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required elevations. Prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.
- E. Control soil and fill compaction, providing minimum percentage of density specified for each area classification indicated below. Correct improperly compacted areas or lifts as directed by Contracting Officer's Representative if soil density tests indicate inadequate compaction.
 1. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density, in accordance with ASTM D 1557:
 - a. Under structures, building slabs and steps, and pavements, compact top 12 inches of subgrade and each layer of backfill or fill material at 95 percent maximum density.
 - b. Under lawn or unpaved areas, compact top 6 inches of subgrade and each layer of backfill or fill material at 90 percent maximum density.
 - c. Under walkways, compact top 6 inches of subgrade and each layer of backfill or fill material at 95 percent maximum density.
 2. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material. Apply water in minimum quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations.
 - a. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
 - b. Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.

3.10 GRADING

- A. General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated or between such points and existing grades.
- B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes and as follows:
 1. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10 foot above or below required subgrade elevations.
 2. Walks: Shape surface of areas under walks to line, grade, and cross-section, with finish surface not more than 0.10 foot above or below required subgrade elevation.
 3. Pavements: Shape surface of areas under pavement to line, grade, and cross-section, with finish surface not more than 1/2 inch above or below required subgrade elevation.
- C. Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

3.11 PAVEMENT SUBBASE COURSE

- A. General: Subbase course consists of placing subbase material, in layers of specified thickness, over subgrade surface to support a pavement base course.
 - 1. Refer to other Division 2 sections for paving specifications.
- B. Grade Control: During construction, maintain lines and grades including crown and cross-slope of subbase course.
- C. Shoulders: Place shoulders along edges of subbase course to prevent lateral movement. Construct shoulders of acceptable soil materials, placed in such quantity to compact to thickness of each subbase course layer. Compact and roll at least a 12-inch width of shoulder simultaneous with the compaction and rolling of each layer of subbase course.
- D. Placing: Place subbase course material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting subbase material during placement operations.
 - 1. When a compacted subbase course is indicated to be 6 inches thick or less, place material in a single layer. When indicated to be more than 6 inches thick, place material in equal layers, except no single layer more than 6 inches or less than 3 inches in thickness when compacted.

3.12 FIELD QUALITY CONTROL

- A. Quality Control Testing During Construction: Allow testing service to inspect and approve each subgrade and fill layer before further backfill or construction work is performed.
 - 1. Perform field density tests in accordance with ASTM D 1556 (sand cone method) or ASTM D 2167 (rubber balloon method), as applicable.
 - a. Field density tests may also be performed by the nuclear method in accordance with ASTM D 2922, providing that calibration curves are periodically checked and adjusted to correlate to tests performed using ASTM D 1556. In conjunction with each density calibration check, check the calibration curves furnished with the moisture gages in accordance with ASTM D 3017.
 - b. If field tests are performed using nuclear methods, make calibration checks of both density and moisture gages at beginning of work, on each different type of material encountered, and at intervals as directed by the Contracting Officer's Representative.
 - 2. Footing Subgrade: For each strata of soil on which footings will be placed, perform at least one test to verify required design bearing capacities. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested strata when acceptable to Contracting Officer's Representative.
 - 3. Paved Areas and Building Slab Subgrade: Perform at least one field density test of subgrade for every 2,000 sq. ft. of paved area or building slab, but in no case fewer than three tests. In each compacted fill layer, perform one field density test for every 2,000 sq. ft. of overlaying building slab or paved area, but in no case fewer than three tests.
 - 4. Foundation Wall Backfill: Perform at least two field density tests at locations and elevations as directed.
 - 5. Trench Backfill: Perform at least one (1) field density test for every 100 linear feet of trench with a minimum of two (2) tests.
 - 6. If in opinion of Contracting Officer's Representative, based on testing service reports and inspection, subgrade or fills that have been placed are below specified density, perform additional compaction and testing until specified density is obtained.

3.13 EROSION CONTROL

- A. Provide erosion control methods in accordance with requirements of the Contracting Officer's Representative.

3.14 MAINTENANCE

- A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances.
- C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.
- D. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.15 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Removal to Designated Areas on Government's Property: Transport acceptable excess excavated material to designated soil storage areas on Government's property. Stockpile soil or spread as directed by Contracting Officer's Representative.
 - 1. Transport waste material, including unacceptable excavated material, trash, and debris to designated spoil areas offsite and dispose of as directed.

END OF SECTION 02200

SECTION 02511 - HOT-MIXED ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes provisions for hot-mixed asphalt paving over prepared subbase and base material.
- B. Prepared subbase is specified in another Division 2 section.
- C. Proof rolling of prepared subbase is included in this Section.
- D. Saw-cutting of edges of existing pavement is specified in site-clearing section.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Material Certificates signed by material producer and Contractor, certifying that each material item complies with or exceeds specified requirements.
- C. Pavement marking plan indicating lane separations and defined parking spaces. Note dedicated handicapped spaces with international graphics symbol.

1.4 SITE CONDITIONS

- A. Weather Limitations: Apply prime and tack coats when ambient temperature is above 50 deg Fahrenheit (10 deg Celsius) and when temperature has not been below 35 deg Fahrenheit (1 deg Celsius) for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess of moisture.
- B. Construct hot-mixed asphalt surface course when atmospheric temperature is above 40 deg Fahrenheit (4 deg Celsius) and when base is dry. Base course may be placed when air temperature is above 30 deg Fahrenheit (minus 1 deg Celsius) and rising, as approved by the Contracting Officer's Representative.
- C. Grade Control: Establish and maintain required lines and grades indicating crown and cross-slope for each course during construction.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Use locally available materials and gradations that exhibit a satisfactory record of previous installations.
- B. Coarse Aggregate: Sound, angular crushed stone, crushed gravel, or properly cured crushed blast furnace slag, complying with ASTM D 692-88.
- C. Fine Aggregate: Sharp-edged natural sand or sand prepared from stone, properly cured blast furnace slag, gravel, or combinations thereof, complying with ASTM D 1073.
- D. Mineral Filler: Rock or slag dust, hydraulic cement, or other inert material complying with ASTM D 242.
- E. Asphalt Cement: ASTM D 3381 for viscosity-graded material; ASTM D 946 for penetration-graded material.
- F. Prime Coat: Cut-back asphalt type, ASTM D 2027; MC-30, MC-70 or MC-250.
- G. Tack Coat: Emulsified asphalt; ASTM D 977.
- H. Herbicide Treatment: Commercial chemical for weed control, registered by Environmental Protection Agency. Provide granular, liquid, or wettable powder form.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may

- be incorporated in the work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products of one of the following:
 - a. Ciba-Geigy Corp.
 - b. Dow Chemical U.S.A.
 - c. E.I. Du Pont de Nemours & Co., Inc.
 - d. FMC Corp.
 - e. Thompson-Hayward Chemical Co.
 - f. U.S. Borax and Chemical Corp.

2.2 ASPHALT-AGGREGATE MIXTURE

- A. Provide plant-mixed, hot-laid asphalt-aggregate mixture complying with ASTM D 3515 and as recommended by local paving authorities to suit project conditions. The asphalt shall conform to LDOTD standards, Section 501, Type I.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

- A. General: Remove loose material from compacted base surface immediately before applying herbicide treatment or prime coat.
- B. Proof-roll prepared base surface to check for unstable areas and areas requiring additional compaction.
- C. Notify Contractor of unsatisfactory conditions. Do not begin paving work until deficient base areas have been corrected and are ready to receive paving. All loose and foreign material shall be removed from the base surface by light sweeping. Material removed shall not be mixed with cover aggregate.
- D. Herbicide Treatment: Apply chemical weed control agent in strict compliance with manufacturer's recommended dosages and application instructions. Apply to compacted, dry base prior to application of prime coat.
- E. Prime Coat: Apply at rate of 0.25 to 0.35 gal. per sq. yd., over compacted base. Apply material to penetrate and seal, but not flood, surface. Cure and dry as long as necessary to attain penetration and evaporation of volatile.
- F. Tack Coat: Apply to contact surfaces of previously constructed asphalt or Portland cement concrete and surfaces abutting or projecting into hot-mixed asphalt pavement. Distribute at rate of 0.05 to 0.15 gal. per sq. yd. of surface.
- G. Allow to dry until at proper condition to receive paving.
- H. Exercise care in applying bituminous materials to avoid smearing of adjoining concrete surfaces. Remove and clean damaged surfaces.

3.2 PLACING MIX

- A. Application of Prime Coat
 1. A prime coat shall be applied to surfaces of bases at least 24 hours prior to placing the asphaltic concrete. Asphalt primer shall be applied uniformly at the rate of 0.25 to 0.35 gallons per square yard at a temperature not less than 100 degrees Fahrenheit nor more than 120 degrees Fahrenheit. The exact rate shall be as directed by the Contracting Officer's Representative. It shall be applied only when the surface is dry or slightly damp, when the air temperature in the shade is not less than 35 degrees Fahrenheit.
 2. Liquid asphalt shall be prevented from spraying upon adjacent pavements, structures guard rails, guide posts, culvert markers, trees and shrubbery that are not to be removed, adjacent property and improvements, and other facilities, or that portion of the traveled way being used by traffic.
 3. The Contractor shall protect the prime coat against all damage and markings both from foot and other traffic. Barricades shall be placed where necessary to protect the prime coat. If, after the prime coat has been applied to the satisfaction of the Contracting Officer's Representative and has been accepted by him, it is disturbed by negligence on the part of the Contractor, it shall be restored at Contractor's expense to its condition at time of acceptance. No material shall be placed until the prime coat is in a condition satisfactory to the Contracting Officer's Representative.
- B. Placing Asphaltic Concrete Paving
 1. At the time of the delivery to site of the work, the temperature of mixture shall be not lower than 250 degrees

Fahrenheit nor higher than 320 degrees Fahrenheit the lower limit to be approached in warm weather and the higher in cold weather. Asphalt concrete may be placed when the temperature is 40 degrees Fahrenheit and rising, and the weather is favorable as determined by the Contracting Officer's Representative. Work shall cease when the falling temperature reaches 45 degrees Fahrenheit.

2. The asphalt concrete shall be evenly spread upon the subgrade or base to such a depth that after rolling it will be of the specified cross section and grade of the course being constructed.
 3. Depositing and spreading of the asphalt concrete shall be accomplished by means of self-propelled mechanical spreading and finishing machine.
 4. The six inch strip adjacent to the area on which additional material is to be laid shall not be rolled until such additional material is placed, unless adjacent lay down is made within one hour.
 5. After the first has been placed and rolled, the second strip and succeeding strips shall be placed, and rolling shall be extended to include the six inches of the first strip not previously rolled. The succeeding strips shall be placed while the unrolled six inch section of the adjoining strip is hot and in a readily compatible condition. The length of any strip to be laid before placing the succeeding strip shall be as determined by the Contracting Officer's Representative, depending on weather and field conditions.
 6. Placing once commenced must be continued without interruption. No greater amount of mixture shall be delivered in any one day than can be properly distributed and rolled during that day.
 7. In narrow, deep or irregular sections, intersections, turnouts or driveways, where it is impractical to spread and finish the base and level the surface mixtures by machine methods, the Contractor may use spreading equipment or acceptable hand methods, approved by the Contracting Officer's Representative.
- C. Paver Placing: Place in strips not less than 10 feet wide, unless otherwise acceptable to Contracting Officer's Representative. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete base course for a section before placing surface course.
- D. Immediately correct surface irregularities in finish course behind paver. Remove excess material forming high spots with shovel or lute.
- E. Joints: Make joints between old and new pavements, or between successive days' work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density, and smoothness as other sections of hot-mixed asphalt course. Clean contact surfaces and apply tack coat.
- F. Curbs: Construct curbs over compacted pavement surfaces. Apply a light tack coat unless pavement surface is still tacky and free from dust.
- G. Place curb materials to cross-section indicated or, if not indicated, to local standard shapes, by machine or by hand in wood or metal forms. Tamp hand-placed materials and screed to smooth finish. Remove forms as soon as material has cooled.

3.3 COMPACTION AND FINISH

- A. General: Begin rolling when mixture will bear roller weight without excessive displacement.
- B. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
- C. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling and repair displaced areas by loosening and filling, if required, with hot material.
- D. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been evenly compacted.
- E. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained 95 percent laboratory density.
- F. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot-mixed asphalt. Compact by rolling to specified surface density and smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.4 TRAFFIC AND LANE MARKINGS

- A. Cleaning: Sweep and clean surface to eliminate loose material and dust.
- B. Striping: Use chlorinated-rubber base traffic lane-marking paint, factory-mixed, quick-drying, and nonbleeding.
- C. Do not apply traffic and lane marking paint until layout and placement have been verified with Contracting Officer's Representative.
- D. Apply paint with mechanical equipment to produce uniform straight edges. Apply at manufacturer's recommended rates to provide minimum 12 to 15 mils dry thickness.

3.5 WHEEL STOPS

- A. General: Secure wheel stops to hot-mixed asphalt surface with not less than two 3/4-inch-diameter galvanized steel dowels embedded in precast concrete at 1/3 points. Size length of dowel to penetrate at least 1/2 hot-mixed asphalt depth.

3.6 FIELD QUALITY CONTROL

- A. General: Testing in-place hot-mixed asphalt courses for compliance with requirements for thickness and surface smoothness will be done by Government's testing laboratory. Repair or remove and replace unacceptable paving as directed by Contracting Officer's Representative.
- B. Thickness: In-place compacted thickness tested in accordance with ASTM D 3549 will not be acceptable if exceeding following allowable variations:
 - 1. Base Course: Plus or minus 1/2 inch.
 - 2. Surface Course: Plus or minus 1/4 inch.
- C. Surface Smoothness: Test finished surface of each hot-mixed asphalt course for smoothness, using 10-foot straightedge applied parallel with and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness:
 - 1. Base Course Surface: 1/4 inch.
 - 2. Wearing Course Surface: 3/16 inch.
 - 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.
- D. Check surface areas at intervals as directed by Contracting Officer's Representative.

END OF SECTION 02511

SECTION 02520 - PORTLAND CEMENT CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. Extent of portland cement concrete paving is shown on drawings, including curbs, gutters, walkways, and pavement.
- B. Prepared subbase is specified in "Earthwork" section.
- C. Concrete and related materials are specified in Division 3.
- D. Joint fillers and sealers are specified in Division 7.

1.3 SUBMITTALS

- A. Provide samples, manufacturer's product data, test reports, and materials' certifications as required in referenced sections for concrete and joint fillers and sealers.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Comply with local governing regulations if more stringent than herein specified.

1.5 JOB CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
 - 1. Coordinate with requirements for "Temporary Facilities" specified in Division 1.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Forms: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects.
 - 1. Use flexible spring steel forms or laminated boards to form radius bends as required.
- B. Coat forms with a nonstaining form release agent that will not discolor or deface surface of concrete.
- C. Reinforcing Bars: Deformed steel bars, ASTM A 615, Grade 60.
- D. Fabricated Bar Mats: Welded or clip-assembled steel bar or rod mats, ASTM A 184. Use ASTM A 615, Grade 60 steel bars, unless otherwise indicated.
- E. Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.
- F. Hook Bolts: ASTM A 307, Grade A bolts, internally and externally threaded. Design hook bolt joint assembly to hold coupling against pavement form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- G. Concrete Materials: Comply with requirements of applicable Division 3 sections for concrete materials, admixtures, bonding materials, curing materials, and others as required.
- H. Expansion Joint Materials: Comply with requirements of applicable Division 7 sections for preformed expansion joint fillers and sealers.
- I. Antispalling Compound: Combination of boiled linseed oil and mineral spirits, complying with AASHTO M-233.
- J. Liquid-Membrane Forming and Sealing Curing Compound: Comply with ASTM C 309, Type I, Class A unless other type acceptable to Architect. Moisture loss no more than 0.055 gr./sq. cm. when applied at 200 sq. ft. / gal.

1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
 - a. "Masterseal"; Master Builders.
 - b. "A-H 3 Way Sealer"; Anti-Hydro Waterproofing Co.
 - c. "Ecocure"; Euclid Chemical Co.
 - d. "Clear Seal"; A. C. Horn.
 - e. "J-20 Acrylic Cure"; Dayton Superior.
 - f. "Sure Cure"; Kaufman Products Inc.
 - g. "AR -30" W.R. Meadows.
 - h. "Spartan-Cote"; The Burke Co.
 - i. "Sealkure"; Toch Div. - Carboline.
 - j. "Kure-N-Seal"; Sonneborn-Contech.
 - k. "Polyclear"; Upco Chemical/USM Corp.
 - l. "L&M Cure"; L & M Construction Chemicals.
 - m. "Klearseal"; Setcon Industries.
 - n. "LR-152"; Protex Industries.
 - o. "Hardtop"; Gifford - Hill.

- K. Bonding Compound: Polyvinyl acetate or acrylic base, rewettable type.
 1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
 - a. "J-40 Bonding Agent"; Dayton Superior Corp.
 - b. "Weldcrete"; Larsen Products.
 - c. "Intralok"; W.R. Meadows.
 - d. "Everbond"; L & M Construction Chemicals.
 - e. "EucoWeld"; Euclid Chemical Co.
 - f. "Hornweld"; A. C. Horn.
 - g. "Sonocrete"; Sonneborn-Contech.
 - h. "Acrylic Bondcrete"; The Burke Co.

- L. Epoxy Adhesive: ASTM C 881, 2-component material suitable for use on dry or damp surfaces. Provide material "Type", "Grade", and "Class" to suit project requirements.
 1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include but are not limited to the following:
 - a. "Epoxitite"; A. C. Horn.
 - b. "Edoco 2118 Epoxy Adhesive"; Edoco Technical Prod.
 - c. "Sikadur Hi-Mod"; Sika Chemical Corp.
 - d. "Euco Epoxy 463 or 615"; Euclid Chemical Co.
 - e. "Patch and Bond Epoxy"; The Burke Co.
 - f. "Sure-Poxy"; Kaufman Products Inc.

2.2 CONCRETE MIX, DESIGN, AND TESTING

- A. Comply with requirements of applicable Division 3 sections for concrete mix design, sampling and testing, and quality control and as herein specified.
- B. Design mix to produce normal-weight concrete consisting of portland cement, aggregate, water-reducing or high-range water-reducing admixture (superplasticizer), air-entraining admixture, and water to produce the following properties:
 1. Compressive Strength: 3000 psi, minimum at 28 days, unless otherwise indicated.
 2. Slump Limits: 8 inches minimum for concrete containing high-range water-reducing admixture (superplasticizer); 3 inches for other concrete without water reducing admixtures.
 3. Air Content: 5 to 8 percent.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

- A. Remove loose material from compacted base surface immediately before placing concrete.
- B. Proof-roll prepared base surface to check for unstable areas and need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving.

3.2 FORM CONSTRUCTION

- A. Set forms to required grades and lines, braced and secured. Install forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.
- B. Check completed formwork for grade and alignment to following tolerances:
 - 1. Top of forms not more than 1/8 inch in 10 feet.
 - 2. Vertical face on longitudinal axis, not more than 1/4 inch in 10 feet.
- C. Clean forms after each use and coat with form release agent as required to ensure separation from concrete without damage.

3.3 REINFORCEMENT

- A. Locate, place and support reinforcement as specified in Division 3 sections, unless otherwise indicated.

3.4 CONCRETE PLACEMENT

- A. General: Comply with requirements of Division 3 sections for mixing and placing concrete, and as herein specified.
- B. Do not place concrete until base and forms have been checked for line and grade by Contracting Officer's Representative. Moisten base if required to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- C. Place concrete by methods that prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices.
- D. Use bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- E. Deposit and spread concrete in a continuous operation between transverse joints as far as possible. If interrupted for more than 1/2 hour, place a construction joint.
- F. When adjacent pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained sufficient strength to carry loads without injury.
- G. Fabricated Bar Mats: Keep mats clean and free from excessive rust, and handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities or replace units as required before placement. Set mats for a minimum 4-inch overlap to adjacent mats.
 - 1. Place concrete in 2 operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.
 - 2. Remove and replace portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer or use bonding agent if acceptable to Architect.
- H. Curbs and Gutters: Automatic machine may be used for curb and gutter placement at Contractor's option. If machine placement is to be used, submit revised mix design and laboratory test results that meet or exceed minimums specified. Machine placement must produce curbs and gutters to required cross-section, lines, grades, finish, and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete as specified.

3.5 JOINTS

- A. General: Construct expansion, weakened-plane (contraction), and construction joints true to line with face perpendicular to surface of concrete. Construct transverse joints at right angles to the centerline, unless otherwise indicated.
- B. When joining existing structures, place transverse joints to align with previously placed joints, unless otherwise indicated.
- C. Weakened-Plane (Contraction) Joints: Provide weakened-plane (contraction) joints, sectioning concrete into areas as directed by the Contracting Officer's Representative. Construct weakened-plane joints for a depth equal to at least 1/4 concrete thickness, as follows:
 - 1. Tooled Joints: Form weakened-plane joints in fresh concrete by grooving top portion with a recommended cutting tool and finishing edges with a jointer.

2. Sawed Joints: Form weakened-plane joints with powered saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut joints into hardened concrete as soon as surface will not be torn, abraded, or otherwise damaged by cutting action.
 3. Inserts: Use embedded strips of metal or sealed wood to form weakened-plane joints. Set strips into plastic concrete and carefully remove strips after concrete has hardened.
- D. Construction Joints: Place construction joints at end of placements and at locations where placement operations are stopped for more than 1/2 hour, except where such placements terminate at expansion joints.
1. Construct joints as shown or, if not shown, use standard metal keyway-section forms.
 2. Where load transfer-slip dowel devices are used, install so that one end of each dowel bar is free to move.
- E. Expansion Joints: Provide premolded joint filler for expansion joints abutting concrete curbs, catch basins, manholes, inlets, structures, walks, and other fixed objects, unless otherwise indicated.
1. Locate expansion joints at 50 feet o.c. for each pavement lane unless otherwise indicated.
- F. Extend joint fillers full width and depth of joint, not less than 1/2 inch or more than 1 inch below finished surface where joint sealer is indicated. If no joint sealer, place top of joint filler flush with finished concrete surface.
- G. Furnish joint fillers in one-piece lengths for full width being placed wherever possible. Where more than one length is required, lace or clip joint filler sections together.
- H. Protect top edge of joint filler during concrete placement with a metal cap or other temporary material. Remove protection after concrete has been placed on both sides of joint.
- I. Fillers and Sealants: Comply with requirements of applicable Division 7 sections for preparation of joints, materials, installation, and performance.

3.6 CONCRETE FINISHING

- A. After striking-off and consolidating concrete, smooth surface by screeding and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.
- B. After floating, test surface for trueness with a 10-ft. straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous smooth finish.
- C. Work edges of slabs, gutters, back top edge of curb, and formed joints with an edging tool, and round to 1/2-inch radius, unless otherwise indicated. Eliminate tool marks on concrete surface.
- D. After completion of floating and when excess moisture or surface sheen has disappeared, complete troweling and finish surface as follows:
1. Broom finish by drawing a fine-hair broom across concrete surface perpendicular to line of traffic. Repeat operation if required to provide a fine line texture acceptable to Architect.
 - a. On inclined slab surfaces, provide a coarse, non-slip finish by scoring surface with a stiff-bristled broom, perpendicular to line of traffic.
 2. Burlap finish by dragging a seamless strip of damp burlap across concrete, perpendicular to line of traffic. Repeat operation to provide a gritty texture acceptable to Architect.
- E. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Architect.

3.7 CURING

- A. Protect and cure finished concrete paving in compliance with applicable requirements of Division 3 sections. Use membrane-forming curing and sealing compound or approved moist-curing methods.
- B. Antispalling Treatment: Apply treatment to concrete surfaces no sooner than 28 days after placement, to clean, dry concrete free of oil, dirt, and other foreign material. Apply curing and sealing compound at a maximum coverage rate of 300 s.f. per gallon. Apply antispalling compound in 2 sprayed applications. First application at rate of 40 sq. yds. per gal.; second application, 60 sq. yds. per gallon. Allow complete drying between applications.

3.8 REPAIRS AND PROTECTIONS

- A. Repair or replace broken or defective concrete, as directed by Architect.
- B. Drill test cores where directed by Contracting Officer's Representative when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.
- C. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Sweep concrete pavement and wash free of stains, discolorations, dirt, and other foreign material just before final inspection.

END OF SECTION 02520

SECTION 02668 - WATER SERVICE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes water service piping and appurtenances from the source of potable water to a point 10 feet outside the building.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 2 Section "Earthwork" for excavation and backfill required for water service piping and structures.
 - 2. Division 3 Section "Concrete Work" for supports and structures.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for valves, and hydrants, and identification devices.
- C. Shop drawings for precast concrete boxes including frames and covers.
- D. Shop drawings for cast-in-place concrete boxes including frames and covers.
- E. Coordination drawings showing pipe sizes, and valves and hydrant locations and elevations. Include details of underground structures, connections, anchors, and reaction backing. Show other piping in the same trench and clearances from water service piping. Indicate interface and spatial relationship between piping and proximate structures.
- F. Coordination profile drawings showing water service piping in elevation. Draw profiles at a horizontal scale of not less than 1 inch equals 50 feet and a vertical scale of not less than 1 inch equals 5 feet. Indicate pipe, valves, structures, meter, anchors, and reaction backing. Show types, sizes, materials, and elevations of other utilities crossing water service piping.
- G. Record drawings at project closeout of installed water service piping and products in accordance with requirements of Division 1.
- H. Maintenance data for valves and appurtenances, for inclusion in Operating and Maintenance Manuals specified in Division 1 Section "Project Closeout."

1.4 QUALITY ASSURANCE

- A. Comply with requirements of utility supplying water valve boxes to the project.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare water valve boxes for shipping as follows:
 - 1. Ensure valves are dry and internally protected against rust and corrosion.
 - 2. Protect valves against damage to threaded ends, flange faces, and weld ends.
 - 3. Set valves in best position for handling.
- B. Storage: Use the following precautions for valves during storage:
 - 1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
 - 2. Protect valves from weather. Store valves indoors. Maintain valve temperature higher than the ambient dew point temperature. If outdoor storage is necessary, support valves off the ground or pavement in watertight enclosures.
- C. Handling: Use a sling to handle valves whose size requires handling by crane or lift. Rig valves to avoid damage to

exposed valve parts. Do not use handwheels or stems as lifting or rigging points.

1.6 PROJECT CONDITIONS

- A. Site Information: Perform site survey, research utility records, and verify existing utility locations. Verify that valve boxes may be installed in compliance with the original design and referenced standards.

1.7 SEQUENCING AND SCHEDULING

- A. Coordinate connection to water main with Contracting Officer's Representative.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Gate Valves:

- a. American Darling Valve; Div. of American Cast Iron Pipe Co.
- b. Clow Valve Co.; Div. of McWane, Inc.
- c. Hammond Valve Corp.
- d. Jenkins Bros.
- e. Kennedy Valve; Div. of McWane, Inc.
- f. Milwaukee Valve Co.
- g. Mueller-Hersey; A Grinnell Co.
- h. Nibco, Inc.
- i. Stockham Valve & Fittings, Inc.
- j. U.S. Pipe & Foundry Co.
- k. Waterous Co.

2. Bronze Corporation Stops and Valves:

- a. Ford Meter Box Co., Inc.
- b. Hays Div., Romac Industries
- c. McDonald, A.Y., Mfg. CO.
- d. Mueller-Hersey; A Grinnell Co.

3. Drilling Machine Corporation Stops:

- a. Ford Meter Box Co., Inc.
- b. Hays Div., Romac Industries
- c. Mueller-Hersey; A Grinnell Co.

4. Tapping Valves:

- a. Clow Valve Co.; Div. of McWane, Inc.
- b. Kennedy Valve; Div. of McWane, Inc.
- c. Mueller-Hersey; A Grinnell Co.
- d. U.S. Pipe & Foundry Co.

5. Indicator Posts:

- a. American Darling Valve, Div. of American Cast Iron Pipe Co.
- b. Clow Valve Co.; Div. of McWane, Inc.
- c. Kennedy Valve; Div. of McWane, Inc.
- d. Mueller-Hersey; A Grinnell Co.
- e. Nibco, Inc.
- f. Stockham Valves & Fittings, Inc.
- g. U.S. Pipe & Foundry Co.
- h. Waterous Co.

6. Dry-Barrel Fire Hydrants:

- a. American Darling Valve, Div. of American Cast Iron Pipe Co.
- b. Clow Valve Co.; Div. of McWane, Inc.

- c. Kennedy Valve; Div. of McWane, Inc.
 - d. Mueller-Hersey; A Grinnell Co.
 - e. Waterous Co.
7. Wet-Barrel Fire Hydrants:
- a. Clow Valve Co.; Div. of McWane, Inc.
 - b. Mueller-Hersey; A Grinnell Co.
8. Underground Warning Tapes:
- a. Allen Systems, Inc.; Reef Industries, Inc.
 - b. Brady (W.H.) Co.; Signmark Div.
 - c. Calpico, Inc.
 - d. Carlton Industries, Inc.
 - e. EMED Co., Inc.
 - f. Seton Name Plate Co.

2.2 PIPE AND PIPE FITTINGS, GENERAL

- A. Pipe and pipe fitting materials shall be compatible with each other. Where more than one type of material or product is indicated, selection is Installer's option.
- B. Ductile-Iron Pipe 4 Inches and Larger: AWWA C151, Class 50, except that pipe smaller than 6-inch size shall be Class 51.
 - 1. Lining: AWWA C104, cement mortar, sealcoated.
 - 2. Gaskets: AWWA C111.
 - 3. Ductile-Iron and Cast-Iron Fittings: AWWA C110, ductile-iron or cast-iron, 250-psi pressure rating; or AWWA C153, ductile-iron compact fittings, 350-psi pressure rating.
 - a. Lining: AWWA C104, cement mortar.
 - b. Gaskets: AWWA C111, rubber.
 - 4. Encasement: AWWA C105, polyethylene film tube.
- C. PVC (Polyvinyl Chloride) Pipe 4 Inches and Larger: AWWA C900; Class 150; with bell end and elastomeric gasket, with plain end for cast-iron or ductile-iron fittings, or with plain end for PVC elastomeric gasket fittings.
 - 1. Gaskets: ASTM F 477, elastomeric seal.
 - 2. PVC Couplings and Fittings: AWWA C900, with ASTM F 477 elastomeric seal gaskets.
 - 3. Ductile-Iron and Cast-Iron Fittings: AWWA C110, ductile-iron or cast-iron, 250-psi pressure rating; or AWWA C153, ductile-iron compact fittings, 350-psi pressure rating; of dimension to match pipe outside diameter.
 - a. Lining: AWWA C104, cement mortar.
 - b. Gaskets: AWWA C111, rubber.
- D. Fiberglass Pressure Pipe 2 Inches and Larger: AWWA C950; Type I, filament wound or Type II, centrifugally cast; Grade 1, glass-fiber-reinforced epoxy (RTRP epoxy) or Grade 2, glass-fiber-reinforced (RTRP polyester); unlined or with liner as required for type and grade of pipe; 200 psi minimum pressure class rating.
 - 1. Fiberglass Fittings: AWWA C950, RTRP, adhesive bonding type of material matching or compatible with pipe; 200 psi minimum pressure rating.
 - a. Adhesive: As recommended by pipe and fittings manufacturer.
- E. Copper Water Tube 2 Inches and Smaller: ASTM B 88; Type K, seamless, annealed temper.
 - 1. Copper Fittings: ANSI B16.22, wrought-copper, solder-joint pressure type.
 - a. Solder Filler Metal: ASTM B 32, Alloy HB; tin-antimony-copper-nickel composition, with 0.10 percent maximum lead content.
 - b. Solder Filler Metal: ASTM B 32, Alloy Sb5; tin (95 percent)-antimony (5 percent), with 0.20 percent maximum lead content.
 - c. Solder Filler Metal: ASTM B 32, Alloy Sn95, Alloy Sn94, or Alloy E; tin (approximately 95

- d. percent)-silver or copper (approximately 5 percent), with 0.10 percent maximum lead content.
Solder Filler Metal: ASTM B 32, Alloy HA or Alloy HB; tin-antimony-silver-copper-zinc-nickel composition, with 0.10 percent maximum lead content.
- F. Copper Water Tube 2 Inches and Smaller: ASTM B 88; Type L, seamless, annealed temper.
 - 1. Copper Fittings: ANSI B16.22, wrought-copper, solder-joint pressure type.
 - a. Solder Filler Metal: ASTM B 32, Alloy HB; tin-antimony-copper-nickel composition, with 0.10 percent maximum lead content.
 - b. Solder Filler Metal: ASTM B 32, Alloy Sb5; tin (95 percent)-antimony (5 percent), with 0.20 percent maximum lead content.
 - c. Solder Filler Metal: ASTM B 32, Alloy Sn95, Alloy Sn94, or Alloy E; tin (approximately 95 percent)-silver or copper (approximately 5 percent), with 0.10 percent maximum lead content.
 - d. Solder Filler Metal: ASTM B 32, Alloy HA or Alloy HB; tin-silver-antimony-copper-zinc-nickel, with 0.10 percent maximum lead content.
- G. PVC (Polyvinyl Chloride) Pipe 3 Inches and Smaller: ASTM D 1785, Schedule 40.
 - 1. PVC Fittings: Schedule 40 socket-type, solvent cement joint; or elastomeric gasketed joint.
 - a. Solvent Cement: ASTM D 2564.
 - b. Gaskets: ASTM F 477, elastomeric seal.
- H. Couplings: Iron body sleeve assembly fabricated to match outside diameters of pipes to be joined.
 - 1. Sleeve: ASTM A 126, Class B, gray iron.
 - 2. Followers: ASTM A 47, Grade 32510 or ASTM A 536 ductile iron.
 - 3. Gaskets: Rubber.
 - 4. Bolts and Nuts: AWWA C111.
 - 5. Finish: Enamel paint.

2.3 VALVES

- A. Nonrising Stem Gate Valves 3 Inches and Larger: AWWA C500, cast-iron double disc, bronze disc and seat rings, or AWWA C509, resilient seated; bronze stem, cast-iron or ductile-iron body and bonnet, stem nut, 200-psi working pressure, mechanical joint ends.
- B. Rising Stem Gate Valves, 3 Inches and Larger: AWWA C500, cast-iron double disc, bronze disc and seat rings, or AWWA C509, resilient seated; cast-iron or ductile-iron body and bonnet, OS&Y, bronze stem, 200-psi working pressure, flanged ends.
- C. Nonrising Stem Gate Valves, 2 Inches and Smaller: MSS SP-80; body and screw bonnet of ASTM B 62 cast bronze; with Class 125 threaded ends, solid wedge, nonrising copper-silicon alloy stem, brass packing gland, Teflon-impregnated packing, and malleable iron handwheel.
- D. Valve Boxes: Cast-iron box having top section and cover with lettering "WATER," bottom section with base of size to fit over valve and barrel approximately 5 inches in diameter, and adjustable cast-iron extension of length required for depth of bury of valve.
 - 1. Provide a steel tee-handle operating wrench with each valve box. Wrench shall have tee handle with one pointed end, stem of length to operate valve, and socket fitting valve operating nut.
- E. Curb Stops: Bronze body, ground key plug or ball, and wide tee head, with inlet and outlet to match service piping material.
- F. Service Boxes for Curb Stops: Cast-iron box having telescoping top section of length required for depth of bury of valve and cover having lettering "WATER," and bottom section with base of size to fit over curb stop and barrel approximately 3 inches in diameter.
 - 1. Provide steel tee-handle shut-off rod with each service box. Shut-off rod shall have tee handle with one pointed end, stem of length to operate curb stop, and slotted end fitting curb stop head.
- G. Tapping Sleeve and Tapping Valve: Provide a complete assembly, including tapping sleeve, tapping valve, and bolts and nuts. The sleeve and the valve shall be compatible with the tapping machine to be used.

1. Tapping Sleeve: Cast-iron or ductile-iron 2-piece bolted sleeve with flanged outlet for new branch connection. Sleeve may have mechanical joint ends with rubber gaskets or have sealing rings in the sleeve body. Sleeve shall mate with the size and type pipe material being tapped. Outlet flange shall be size required for branch connection.
- H. Service Clamps and Corporation Stops: Provide a complete assembly, including service clamp, corporation stop, and bolts and nuts. The clamp and stop shall be compatible with the drilling machine to be used.
1. Service Clamp: Cast iron or ductile iron with gasket and AWWA C800 threaded outlet for corporation stop, and threaded end straps.
 2. Corporation Stops: Bronze body and ground key plug, with AWWA C800 threaded inlet and outlet to match service piping material.
 3. Manifold: Copper with two to four inlets, as required, with ends matching corporation stops, and outlet matching service piping.
- I. Indicator Posts: UL 789/FM approved, vertical type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of bury of valve.

2.4 ANCHORAGES

- A. Clamps, Straps, and Washers: ASTM A 506, steel.
- B. Rods: ASTM A 575, steel.
- C. Rod Couplings: ASTM A 197, malleable iron.
- D. Bolts: ASTM A 307, steel.
- E. Cast-Iron Washers: ASTM A 126, gray iron.
- F. Concrete Reaction Backing: Portland cement concrete mix, 3000 psi.
1. Cement: ASTM C 150, Type I.
 2. Fine Aggregate: ASTM C 33, sand.
 3. Coarse Aggregate: ASTM C 33, crushed gravel.
 4. Water: Potable.

2.5 FIRE HYDRANTS

- A. General: Cast-iron body, compression-type valve, opening against pressure and closing with pressure, 6-inch mechanical joint inlet, 150-psi working pressure.
- B. Outlet Threads: NFPA 1963, external hose thread used by the local fire department. Outlets shall have cast-iron caps with steel chains.
- C. Operating and Cap Nuts: Pentagon 1-1/2-inch point to flat.
- D. Direction of Opening: Hydrant valves shall be opened by turning operating nut to the left, or counterclockwise.
- E. Finish: Red exterior alkyd gloss enamel paint.
- F. Dry-Barrel Fire Hydrants: UL 246/FM approved, two 2-1/2- and one 4-1/2-inch outlets, 5-1/4-inch main valve, drain valve, and 6-inch mechanical joint inlet.
- G. Dry-Barrel Fire Hydrants: AWWA C502, two 2-1/2- and one 4-1/2-inch outlets, 5-1/4-inch main valve, drain valve, and 6-inch mechanical joint inlet.
- H. Wet-Barrel Fire Hydrants: UL 246/FM approved, two 2-1/2- and one 4-1/2-inch outlets, 6-inch NPS or flanged inlet, and base section with 6-inch mechanical joint inlet.
- I. Wet-Barrel Fire Hydrants: AWWA C503, two 2-1/2- and one 4-1/2-inch outlets, and 6-inch NPS or flanged inlet, and base section with 6-inch mechanical joint inlet.

2.6 VALVE PITS AND METER PIT

- A. Concrete: Portland cement mix, 3000 psi.

1. Cement: ASTM C 150, Type I.
 2. Fine Aggregate: ASTM C 33, sand.
 3. Coarse Aggregate: ASTM C 33, crushed gravel.
 4. Water: Potable.
- B. Reinforcement: Steel conforming to the following:
1. Fabric: ASTM A 185, welded wire fabric, plain.
 2. Reinforcement Bars: ASTM A 615, Grade 60, deformed.
- C. Ladder: ASTM A 36, steel, or may be polyethylene-encased cast-iron or steel steps.
- D. Manhole: ASTM A 48, Class 35, gray iron, 24-inch minimum diameter traffic frame and cover, of size and weight indicated.
- E. Manhole: ASTM A 536, Grade 60-40-18, ductile iron, 24-inch minimum diameter traffic frame and cover, of size and weight indicated.
- F. Drain: ANSI A112.21.1M, area drain, cast iron, of size indicated. Body shall have anchor flange, light-duty cast-iron grate, and bottom outlet. Drain shall have integral or field-installed bronze ball or clapper-type backwater valve.

2.7 IDENTIFICATION

- A. Plastic Underground Warning Tapes: Polyethylene plastic tape, 6 inches wide by 4 mils thick, solid blue in color with continuously printed caption in black letters "CAUTION - WATER LINE BURIED BELOW."
- B. Metallic-Lined Plastic Underground Warning Tapes: Polyethylene plastic tape with metallic core, 6 inches wide by 4 mils thick, solid blue in color with continuously printed caption in black letters "CAUTION - WATER LINE BURIED BELOW."

PART 3 - EXECUTION

3.1 PREPARATION OF BURIED PIPE FOUNDATION

- A. Grade trench bottom to provide a smooth, firm, stable, and rock-free foundation throughout the length of the piping.
- B. Remove unstable, soft, and unsuitable materials at the surface upon which pipes are to be laid and backfill with granular material to indicated level.
- C. Place gravel bedding material as shown on the trench detail drawing.

3.2 INSTALLATION OF PIPE AND PIPE FITTINGS

- A. Ductile-Iron Pipe: Install with cement-mortar-lined, ductile-iron or cast-iron, mechanical joint or push-on joint fittings and rubber gaskets in accordance with AWWA C600.
 1. Polyethylene Encasement: Install in accordance with AWWA C105.
- B. PVC (Polyvinyl Chloride) Pipe: Install with cement-mortar-lined, ductile-iron or cast-iron, mechanical joint or push-on joint fittings and rubber gaskets in accordance with AWWA M23.
- C. Fiberglass Pressure Pipe: Install with fiberglass pipe fittings and bonding adhesive; in accordance with manufacturer's installation instructions.
- D. Copper Tube: Install with wrought copper, solder joint, pressure fittings, and Sn95 Tin-Antimony solder in accordance with CDA "Copper Tube" handbook.
- E. PVC (Polyvinyl Chloride) Pipe: Install with PVC, Schedule 40 socket-type, solvent cement or elastomeric gasketed fittings in accordance with manufacturer's installation instructions.
- F. Depth of Cover: Provide minimum cover over piping of 12 inches below average local frost depth or 36 inches below finished grade, whichever is greater.
- G. Water Main Connection: Arrange tap in water main, of size and in location as directed by the Contracting Officer's Representative.

1. Install tapping sleeve and tapping valve in accordance with manufacturer's installation instructions.
 2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
 3. Install gate valve onto tapping sleeve. Comply with AWWA C600. Install valve with stem pointing up and with cast-iron valve box.
 4. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water service piping.
 5. Install service clamps and corporation stops in size, quantity, and arrangement required by the utility company standards, and in accordance with manufacturer's installation instructions.
 6. Install service clamps on pipe to be tapped. Position outlet for corporation stop.
 7. Install corporate stops into service clamps. Install valve with stem pointing up and with cast-iron valve box.
 8. Install curb stop in service piping with head pointing up and with cast-iron service box.
 9. Install manifold for multiple taps in water main.
 10. Use drilling machine compatible with service clamp and corporate stop. Drill hole in main. Remove drilling machine and connect water service piping.
- H. Water Service Termination: Terminate water service piping 10'-0" from building foundation in location and invert as indicated. Provide temporary pipe plug for piping extension into building.
- I. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed, by tunneling, jacking, or a combination of both.

3.3 INSTALLATION OF VALVES

- A. General Application: Use mechanical joint end valves for 3-inch and larger buried installation. Use threaded and flanged end valves for installation in pits and inside building. Use bronze corporation stops and valves, with ends compatible to piping, for 2-inch and smaller installation.
- B. AWWA-Type Gate Valves: Comply with AWWA C600. Install buried valves with stem pointing up and with cast-iron valve box.
- C. Bronze Corporation Stops and Curb Stops: Comply with manufacturer's installation instructions. Install buried curb stops with head pointed up and with cast-iron curb box.
- D. UL/FM-Type Gate Valves: Comply with NFPA 24.
1. Install buried valves and valves in pit with stem pointing up and with vertical cast iron indicator post.

3.4 INSTALLATION OF ANCHORAGES

- A. Anchorages: Provide anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches.

3.5 APPLICATION OF PROTECTIVE COATINGS

- A. Apply full coat of asphalt or other acceptable corrosion-retarding material to surfaces of installed ferrous anchorage devices.

3.6 FIRE HYDRANT INSTALLATION

- A. AWWA-Type Fire Hydrants: Comply with AWWA M17. Install with gate valve and provision for drainage as indicated.
- B. UL/FM-Type Fire Hydrants: Comply with NFPA 24. Install with gate valve and provision for drainage as indicated.

3.7 INSTALLATION OF VALVE PITS AND WATER METER PIT

- A. Construct of poured-in-place or precast concrete of dimensions indicated, with manhole frame and cover, ladder, and drain. Provide sleeves with waterproof sleeve seals for pipe entry and exit.

3.8 INSTALLATION OF IDENTIFICATION

- A. Install continuous plastic underground warning tape during back-filling of trench for underground water service piping. Locate twelve (12) inches below finished grade, directly over piping.
- B. Attach a twelve (12) gauge wire to the length of the water pipe and extend to surface at all fittings.

3.9 FIELD QUALITY CONTROL

- A. Piping Tests: Conduct piping tests before joints are covered and after thrust blocks have sufficiently hardened. Fill pipeline 24 hours prior to testing and apply test pressure to stabilize system. Use only potable water.
- B. Hydrostatic Tests: Test at not less than 1-1/2 times working pressure for 2 hours.
 - 1. Increase pressure in 50-psi increments and inspect each joint between increments. Hold at test pressure for one hour; decrease to 0 psi. Slowly increase again to test pressure and hold for one more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within above limits.

3.10 CLEANING

- A. Clean and disinfect water distribution piping as follows:
 - 1. Purge all new water distribution piping systems and parts of existing systems that have been altered, extended, or repaired, prior to use.
 - 2. Use the purging and disinfecting procedure prescribed by the authority having jurisdiction by using the requirements in the Louisiana State Sanitary Code, Chapter 12, dated September 1994 including all revisions thereto.
- B. Prepare reports for all purging and disinfecting activities.
- C. All cleaning and disinfection shall be in accordance with Ft. Polk requirements and as directed by the Contracting Officer's Representative.
- D. Bacteriological testing at Ft. Polk is conducted Monday - Thursday only, coordinate all testing with Contracting Representative.

3.11 VALVE SCHEDULE

- A. Nonrising Stem Gate Valves - 4 Inches and Larger:

AWWA - MECH JT

<u>MANUFACTURER</u>	<u>C500</u>	<u>C509</u>
American Darling 55	85	
Clow Valve	F-5065	F-6100
Kennedy Valve	571X	1571X
Mueller-Hersey	A-2380-20	A-2370-20
Stockham Valve	G-743-O	G-701-O
U.S. Pipe	3460	5460
Waterous	300 Series 500 Series	

- B. Rising Stem Gate Valves - 3 Inches and Larger:

AWWA, FLANGED

<u>MANUFACTURER</u>	<u>C500</u>	<u>C509</u>
American Darling 52	82	
Clow Valve	F-5072	F-6136
Kennedy Valve	566	1566
Mueller-Hersey	A-2483-6	A-2373-6
U.S. Pipe	3630	5120
Waterous	300 Series 500 Series	

- C. Nonrising Stem Gate Valves - 2 Inches and Smaller:

<u>MANUFACTURER</u>	<u>MSS SP-80 THREADED</u>
Hammond Valve Corp. IB645	
Jenkins Bros.	370
Milwaukee Valve Co. 1105M	
Nibco	T-113 w/iron HW
Stockham Valve	B-103

D. Tapping Valves:

MANUFACTURER

American Darling	565 or 865	
Clow Valve		F-5093
Kennedy Valve		950X
Mueller-Hersey		H-667
U.S. Pipe		3860

E. Corporation Stops and Curb Stops:

MANUFACTURER

CORP. STOPS

CURB STOPS

Ford Meter Box	F Series	B Series	
Hays		5000 Series	4000 Series
McDonald, A.Y.	3100, 4700 Series	6100 Series	
Mueller-Hersey	H Series	H Series	

F. Indicator Posts:

MANUFACTURER

UL 789/FM
VERTICAL

UL 789/FM
WALL

American Darling	Style 1	Style 2
Clow Valve	F-5760	F-5765
Kennedy Valve	641	641S
Mueller-Hersey	A-20800	A-20810
Nibco	NIP-1A	NIP-2
Stockham Valve	G-951 A	G-950
Waterous	A 240	A 280

x means not available.

3.12 FIRE HYDRANT SCHEDULE

A. Dry-Barrel Type:

MANUFACTURER

AWWA C502

UL 246/FM

American Darling	B-84-B	B-84-B
Clow Valve	Medallion	F-2505
Kennedy Valve	K81A	K81
Mueller-Hersey	Modern Centurion	A-400
U.S. Pipe	Series H or S	x
U.S. Pipe	** Metropolitan	** Metropolitan 250
	250	
Waterous	WB-67	WB-67U or WB-67F

x means not available.

** means rated at 250 psi.

B. Wet-Barrel Type:

MANUFACTURER

AWWA C503

UL 246/FM

Clow Valve	2060	900 Series
Mueller-Hersey	109 Hi-Flo	480 Hi-Flo
U.S. Pipe	*** Smith Warm	*** Smith Warm Climate
	Climate	

*** means limited availability and not conforming to
AWWA or UL/FM standards.

END OF SECTION 02668

SECTION 02930 - LAWNS AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. Extent of lawns and grasses is shown on drawings.
- B. Types of work required include following:
 - 1. Furnishing and applying soil amendments.
 - 2. Furnishing and applying fertilizers.
 - 3. Seeding areas disrupted by construction.
 - 4. Sodding lawn areas disrupted by construction.
 - 5. Replanting unsatisfactory or damaged lawns.
- C. Refer to earthwork sections in this Division for requirements of general excavation, filling, and grading in areas to receive lawns and grasses.
- D. Topsoil has (or will be) stockpiled for reuse in lawns and grasses. If quantity of stockpiled topsoil is insufficient, provide additional topsoil to complete lawns and grasses.

1.3 SUBMITTALS

- A. Certification of Grass Seed: Submit seed vendor's certified statement for each grass seed mixture required, stating botanical and common name, percentage by weight, and percentages of purity, germination, and weed seed for each grass seed species.
- B. Sod Analysis: Notify Contracting Officer's Representative of sod source, including name and telephone number of supplier, and seed mix of sod.

1.4 JOB CONDITIONS

- A. Planting Time: Sow lawn seed only during normal planting seasons for each type of lawn work required. Correlate planting with specified maintenance periods to provide required maintenance from date of substantial completion.

1.5 SPECIAL PROJECT WARRANTY

- A. Warranty lawns and grasses through specified maintenance period and until final acceptance.

PART 2 - PRODUCTS

2.1 NEW TOPSOIL

- A. Provide topsoil that is fertile, friable, naturally loamy, surface soil; reasonably free of subsoil, clay lumps, brush, weeds, and other litter; and free of roots, stumps, stones larger than 2 inches in any dimension, and other extraneous or toxic matter harmful to plant growth.
- B. Obtain topsoil from local sources or from areas having similar soil characteristics to that found at site of work. Obtain topsoil from naturally well-drained sites where topsoil occurs at least 4 inches deep; do not obtain from bogs or marshes.

2.2 SOIL AMENDMENTS

- A. Lime: Natural limestone containing at least 85 percent of total carbonates, ground to such fineness that at least 90 percent passes a 10-mesh sieve and at least 50 percent passes a 100-mesh sieve.
 - 1. Provide lime in form of dolomitic limestone.
- B. Peat Humus: Finely divided or granular texture and with pH of 6.0 to 7.5 composed of moss peat (other than sphagnum), or peat humus, or reed-sedge peat.

2.3 FERTILIZER

- A. Bonemeal: Commercial raw bonemeal, finely ground and with minimum analysis of 4 percent nitrogen and 20 percent phosphoric acid.

2.4 GRASS MATERIALS

- A. Grass Seed: Provide fresh, clean, new-crop seed complying with tolerance for purity and germination established by Official Seed Analysts of North America. Provide seed of grass species, proportions and minimum percentages of purity, germination, and maximum percentage of weed seed as specified.
- B. Sod: Provide machine-cut, strongly rooted, certified turfgrass sod, at least 2 years old and free of weeds and undesirable native grasses. Provide sod capable of vigorous growth and development when planted (viable, not dormant) and complying with the following requirements:
 - 1. Type: St. Augustinegrass (*Stenotaphrum secundatum*).
 - 2. Sod Pad Size: Uniform thickness of 5/8 inch, plus or minus 1/4 inch, measured at time of cutting and excluding top growth and thatch. Provide in supplier's standard size of uniform length and width with maximum 5 percent allowable deviation in either length or width. Broken or torn pads or pads with uneven ends are not acceptable.
 - 3. Sod Strength: Provide sod pads capable of supporting their own weight and retaining size and shape when supplier's standard size pad is suspended vertically from a firm grasp on upper 10 percent of the pad.
- C. Antierosion Mulch: Provide clean, seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
- D. Seed Mulch: Provide peat moss in natural, shredded, or granulated form, of fine texture, with a pH of 4.0 to 6.0 and a water-absorbing capacity of 1,100 to 2,000 percent.

PART 3 - EXECUTION

3.1 SOIL PREPARATION

- A. Limit preparation to areas that will be planted in immediate future.
- B. Loosen subgrade to a minimum depth of 4 inches. Remove stones bigger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter.
- C. Clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful or toxic to plant growth.
- D. Mix soil amendments and fertilizers with topsoil at rates specified. Delay mixing of fertilizer if planting will not follow placing of topsoil mixture within a few days. Either mix soil before spreading or apply soil amendments on surface of spread topsoil and mix thoroughly into top 4 inches of topsoil before planting.
 - 1. Mix lime with dry soil before mixing in fertilizer.
 - 2. Apply phosphoric acid fertilizer (other than that constituting a portion of complete fertilizers) directly to subgrade before tilling.
- E. Spread topsoil mixture to depth required to meet thickness, grades, and elevations shown, after light rolling and natural settlement. Do not spread if material or subgrade is frozen.
 - 1. Place approximately 1/2 of total amount of topsoil mixture required. Work into top of loosened subgrade to create a transition layer, and then place remainder of topsoil mixture.
 - 2. Allow for sod thickness in areas to be sodded.
- F. Grade lawn and grass areas to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted within immediate future. Remove trash, debris, stones larger than 1-1/2 inches diameter, and other objects that may interfere with planting or maintenance operations.
- G. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry off before planting lawns. Do not create muddy soil.
- H. Restore prepared areas to specified condition if eroded or otherwise disturbed after fine grading and before planting.

3.2 SEEDING AREAS DISRUPTED BY CONSTRUCTION

General areas to receive seeding will be in non-housing or non-business areas and as directed by the Contracting Officer's Representative.

- A. Sow seed with a spreader or a seeding machine. Do not seed when wind velocity exceeds 5 miles per hour. Distribute seed evenly over entire area by sowing equal quantity in 2 directions at right angles to each other.
 - 1. Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage.
 - 2. Sow no less than the quantity of seed specified by the Contracting Officer's Representative.
- B. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.
- C. Protect seeded areas against erosion by spreading specified lawn mulch after completion of seeding operations. Spread uniformly to form a continuous blanket at least 1-1/2 inches loose measurement over seeded areas. Spread by hand, blower, or other suitable equipment.
 - 1. Anchor mulch by spraying with asphalt emulsion at the rate of 10 to 13 gallons per 1,000 sq. ft. Take precautions to prevent damage or staining of structures or other plantings adjacent to mulched areas. Immediately clean such areas where damage occurs.
- D. Protect seeded areas against hot, dry weather or drying winds by applying specified mulch within 24 hours after completion of seeding operations. Presoak and scatter evenly to a depth of 1/8 inches to 3/16 inches thick and roll to a smooth surface. Do not mound.

3.3 SODDING LAWNS DISRUPTED BY CONSTRUCTION

General areas to be sodded shall be in housing or business areas and as directed by the Contracting Officer's Representative.

- A. Lay sod within 24 hours of stripping. Do not lay dormant sod or if ground is frozen.
- B. Lay sod to form solid mass with tightly fitted joints. Butt ends and sides of sod strips; do not overlap. Stagger strips to offset joints in adjacent courses. Work from boards to avoid damage to subgrade or sod. Tamp or roll lightly to ensure contact with subgrade. Work sifted soil into minor cracks between pieces of sod; remove excess to avoid smothering adjacent grass.
 - 1. Anchor sod on slopes with wood pegs as required to prevent slippage.
- C. Water sod with fine spray immediately after planting. During first week, water daily or more frequently as necessary to maintain moist soil to depth of 4 inches.

3.4 RECONDITIONING LAWNS

- A. Recondition existing lawn areas damaged by Contractor's operations including storage of materials or equipment and movement of vehicles. Also recondition lawn areas where settlement or washouts occur or where minor regrading is required.
- B. Provide, seed or sod, and soil amendments as specified for new lawns and as required to provide satisfactorily reconditioned lawn. Provide new planting soil as required to fill low spots and meet new finish grades.
- C. Cultivate bare and compacted areas thoroughly to provide a good, deep planting bed.
- D. Remove diseased or unsatisfactory lawn areas; do not bury into soil. Remove topsoil containing foreign materials resulting from Contractor's operations including oil drippings, stone, gravel, and other construction materials; replace with new topsoil.
- E. Where substantial lawn remains (but is thin), mow, rake, aerate if compacted, fill low spots, remove humps, cultivate soil, fertilize, and seed. Remove weeds before seeding. If weeds are extensive, apply selective chemical weed killers as required. Apply a seedbed mulch, if required, to maintain moist condition.
- F. Water newly planted areas and keep moist until new grass is established in seeded areas and sod is acceptable to Contracting Officer's Representative.

3.5 PROTECTION

- A. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period until lawn is established.

3.6 MAINTENANCE

- A. Begin maintenance of lawns immediately after each area is planted and continue for the periods required to establish acceptable lawns, but no less than the following:
 - 1. Seeded lawns, at least 60 days, after date of substantial completion.
 - a. If seeded in fall and not given full 60 days of maintenance, or if not considered acceptable at that time, continue maintenance during following spring until acceptable lawn is established.
 - 2. Sodded lawns, at least 30 days after date of substantial completion.
- B. Maintain lawns by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading, replanting as required to establish a smooth, acceptable lawn, free of eroded or bare areas.
- C. Remulch with new mulch in areas where mulch has been disturbed by wind or maintenance operations sufficiently to nullify its purpose. Anchor as required to prevent displacement.
- D. Replant bare areas with same materials specified for lawns.
- E. Watering: Provide and maintain temporary piping, hoses and lawn watering equipment to convey water from sources and to keep lawn areas uniformly moist as required for proper growth.
- F. Lay out temporary lawn-watering system and arrange watering schedule to prevent puddling, water erosion, and displacement of seed or mulch (if any). Lay out temporary watering system to avoid necessity of walking over muddy or newly seeded or sodded areas.
- G. Mow lawns as soon as there is enough top growth to cut with mower set at specified height for principal species planted. Repeat mowing as required to maintain specified height. Remove no more than 40 percent of grass leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Time initial and subsequent mowings to maintain following grass height:
 - 1. Mow grass from 1/2 inch to 1 inch high.
- H. Apply second fertilizer application after first mowing and when grass is dry.
 - 1. Use fertilizer that will provide at least 1.0 lb. of actual nitrogen per 1,000 sq. ft. of lawn area.

3.7 ACCEPTANCE

- A. When work is substantially completed, including maintenance, Contracting Officer's Representative will, upon request, make an inspection to determine acceptability.
 - 1. Lawn work may be inspected for acceptance in parts agreeable to Contracting Officer's Representative, provided work offered for inspection is complete, including maintenance.
- B. Replant rejected work and continue specified maintenance until reinspected by Contracting Officer's Representative and found to be acceptable.
- C. Seeded lawns will be acceptable provided requirements, including maintenance, have been met and healthy, uniform close stand of specified grass is established free of weeds, bare spots, and surface irregularities.
- D. Sodded lawns will be acceptable provided requirements, including maintenance, have been met and healthy, well-rooted, even-colored, viable lawn is established, free of weeds, open joints, bare areas, and surface irregularities.

3.8 CLEANUP

- A. Promptly remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto surface of roads, walks, or other paved areas.

END OF NSV SECTION 02930

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcing, mix design, placement procedures, and finishes.
- B. Concrete paving and walks are specified in Division 2.
- C. Precast concrete is specified in other Division 3 Sections.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, and others as requested by Contracting Officer's Representative.
- C. Shop drawings for reinforcement, prepared by registered Professional Engineer for fabrication, bending, and placement of concrete reinforcement. Comply with ACI SP-66 (88), "ACI Detailing Manual," showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Include special reinforcement required for openings through concrete structures.
- D. Shop drawings for formwork, prepared by a registered Professional Engineer for fabrication and erection of forms for specific finished concrete surfaces. Show form construction including jointing, special form joint or reveals, location and pattern of form tie placement, and other items that affect exposed concrete visually.
 - 1. Contracting Officer's Representative's review is for general architectural applications and features only. Design of formwork for structural stability and efficiency is Contractor's responsibility.
- E. Samples of materials as requested by Contracting Officer's Representative, including names, sources, and descriptions, as follows:
 - 1. Normal weight aggregates.
 - 2. Fibrous reinforcement.
 - 3. Reglets.
 - 4. Vapor retarder.
- F. Laboratory test reports for concrete materials and mix design test.
- G. Materials certificates in lieu of materials laboratory test reports when permitted by Contracting Officer's Representative. Materials certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified:
 - 1. ACI 318, "Building Code Requirements for Reinforced Concrete."
 - 2. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice."
- B. Concrete Testing Service: Engage a testing laboratory acceptable to Contracting Officer's Representative to perform material evaluation tests and to design concrete mixes.
- C. Materials and installed work may require testing and retesting at any time during progress of work. Tests, including retesting of rejected materials for installed work, shall be done at Contractor's expense.

- D. At least 35 days prior to submittal of design mixes, conduct a meeting* to review detailed requirements for preparing concrete design mixes and to determine procedures for satisfactory concrete operations. Review requirements for submittals, status of coordinating work, and availability of materials. Establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications. Request that representatives of each entity directly concerned with cast-in-place concrete attend conference, including, but not limited to, the following:
1. Contractor's superintendent.
 2. Laboratory responsible for concrete design mixes.
 3. Laboratory responsible for field quality control.
 4. Ready-mix concrete producer.
 5. Concrete subcontractor.
 6. Primary admixture manufacturers.
 7. Contracting Officer's Representative or Government's representative.

*Coordinate w/Contracting Officer to determine whether or not this meeting will take place depending on the project being considered.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.
1. Use overlaid plywood complying with U.S. Product Standard PS-1 "A-C or B-B High Density Overlaid Concrete Form," Class I.
 2. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood," Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
- B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
- C. Forms for Textured Finish Concrete: Units of face design, size, arrangement, and configuration to match Contracting Officer's Representative's control sample. Provide solid backing and form supports to ensure stability of textured form liners.
- D. Form Coatings: Provide commercial formulation form-coating compounds with a maximum VOC of 350 mg/l that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- E. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to exposed surface.
1. Provide ties that, when removed, will leave holes not larger than 1-inch diameter in concrete surface.

2.2 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Galvanized Reinforcing Bars: ASTM A 767, Class II (2.0 oz. zinc psf) hot-dip galvanized, after fabrication and bending.
- C. Epoxy-Coated Reinforcing Bars: ASTM A 775.
- D. Steel Wire: ASTM A 82, plain, cold-drawn steel.
- E. Welded Deformed Steel Wire Fabric: ASTM A 497.
- F. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire-bar-type supports complying with CRSI specifications.
1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
 2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with

legs that are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I.
 - 1. Use one brand of cement throughout project unless otherwise acceptable to Contracting Officer's Representative.
- B. Fly Ash: ASTM C 618, Type C or Type F.
- C. Normal Weight Aggregates: ASTM C 33 and as herein specified. Provide aggregates from a single source for exposed concrete.
 - 1. For exterior exposed surfaces, do not use fine or coarse aggregates containing spalling-causing deleterious substances.
 - 2. Local aggregates not complying with ASTM C 33 but that special tests or actual service have shown to produce concrete of adequate strength and durability may be used when acceptable to Contracting Officer's Representative.
- D. Lightweight Aggregates: ASTM C 330.
- E. Water: Drinkable.
- F. Admixtures, General: Provide admixtures for concrete that contain not more than 0.1 percent chloride ions.
- G. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. "Air-Tite," Cormix.
 - b. "Air-Mix" or "Perma-Air," Euclid Chemical Co.
 - c. "Darex AEA" or "Daravair," W.R. Grace & Co.
 - d. "MB-VR" or "Micro-Air," Master Builders, Inc.
 - e. "Sealtight AEA," W.R. Meadows, Inc.
 - f. "Sika AER," Sika Corp.
- H. Water-Reducing Admixture: ASTM C 494, Type A.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. "Chemtard," ChemMasters Corp.
 - b. "PSI N," Cormix.
 - c. "Eucon WR-75," Euclid Chemical Co.
 - d. "WRDA," W.R. Grace & Co.
 - e. "Pozzolith Normal" or "Polyheed," Master Builders, Inc.
 - f. "Prokrete-N," Prokrete Industries.
 - g. "Plastocrete 161," Sika Corp.
- I. High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C 494, Type F or Type G.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. "Super P," Anti-Hydro Co., Inc.
 - b. "PSI Super," Cormix.
 - c. "Eucon 37," Euclid Chemical Co.
 - d. "WRDA 19" or "Daracem," W.R. Grace & Co.
 - e. "Rheobuild," Master Builders, Inc.
 - f. "PSP," Prokrete Industries.
 - g. "Sikament 300," Sika Corp.
- J. Water-Reducing, Accelerating Admixture: ASTM C 494, Type E.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work

include, but are not limited to, the following:

- a. "Q-Set," Conspec Marketing & Manufacturing Co.
- b. "Gilco Accelerator," Cormix.
- c. "Accelguard 80," Euclid Chemical Co.
- d. "Daraset," W.R. Grace & Co.
- e. "Pozzutec 20," Master Builders, Inc.

K. Water-Reducing, Retarding Admixture: ASTM C 494, Type D.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. "PSI-R Plus," Cormix.
 - b. "Eucon Retarder 75," Euclid Chemical Co.
 - c. "Daratard-17," W.R. Grace & Co.
 - d. "Pozzolith R," Master Builders, Inc.
 - e. "Protard," Prokrete Industries.
 - f. "Plastiment," Sika Corporation.

L. Fibrous Reinforcement: Engineered polypropylene fibers designed for secondary reinforcement of concrete slabs.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. "Fiberstrand 100," Euclid Chemical Co.
 - b. "Fibermesh," Fibermesh, Inc.
 - c. "Forta CR," Forta Corp.
 - d. "Grace Fibers," W.R. Grace & Co.

2.4 RELATED MATERIALS

- A. Reglets: Where resilient or elastomeric sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 0.0217 inch thick (26-gage) galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.
- B. Granular Base: Evenly graded mixture of fine and coarse aggregates to provide, when compacted, a smooth and even surface below slabs on grade.
- C. Sand Cushion: Clean, manufactured or natural sand.
- D. Vapor Retarder: Provide vapor retarder cover over prepared base material where indicated below slabs on grade. Use only materials that are resistant to deterioration when tested in accordance with ASTM E 154, as follows:
1. Polyethylene sheet not less than 8 mils thick.
 2. Water-resistant barrier consisting of heavy Kraft papers laminated together with glass-fiber reinforcement and overcoated with black polyethylene on each side.
 - a. Product: "Moistop," Fortifiber Corp.
- E. Vapor Barrier: Premoulded membrane, seven-ply construction consisting of reinforced core and carrier sheet with fortified bitumen layers, protective weathercoating, and plastic antistick sheet. Water vapor transmission rate of 0.00 grains/sq. ft./hr. when tested in accordance with ASTM E 96, Method B. Provide manufacturer's recommended mastics and gusset tape.
1. Product: "Sealtight Premoulded Membrane With Plasmatic Core," W.R. Meadows, Inc.
- F. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
- G. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.
1. Waterproof paper.
 2. Polyethylene film.
 3. Polyethylene-coated burlap.

- H. Liquid Membrane-Forming Curing Compound: Liquid-type membrane- forming curing compound complying with ASTM C 309, Type I, Class A. Moisture loss not more than 0.055 gr./sq. cm. when applied at 200 sq. ft./gal.
1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. "A-H 3 Way Sealer," Anti-Hydro Co., Inc.
 - b. "Spartan-Cote," The Burke Co.
 - c. "Conspec #1," Conspec Marketing & Mfg. Co.
 - d. "Hardtop," Cormix.
 - e. "Day-Chem Cure and Seal," Dayton Superior Corp.
 - f. "Eucocure," Euclid Chemical Co.
 - g. "Horn Clear Seal," A.C. Horn, Inc.
 - h. "L&M Cure," L & M Construction Chemicals, Inc.
 - i. "Masterkure," Master Builders, Inc.
 - j. "CS-309," W.R. Meadows, Inc.
 - k. "LR-151," Prokrete Industries.
 - l. "Kure-N-Seal," Sonneborn-Rexnord.
 - m. "Stontop CS2," Stonhard, Inc.
- I. Water-Based Acrylic Membrane Curing Compound: ASTM C 309, Type I, Class B.
1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. "Conhard," Conspec Marketing and Mfg. Co.
 - b. "Safe Cure and Seal," Dayton Superior Corp.
 - c. "Aqua-Cure," Euclid Chemical Co.
 - d. "Dress & Seal #18WB," L&M Construction Chemicals, Inc.
 - e. "Masterseal W," Master Builders, Inc.
 - f. "Intex," W.R. Meadows, Inc.
 - g. "Sika Membrane," Sika Corp.
- J. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.
1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. "Eucobar," Euclid Chemical Co.
 - b. "E-Con," L&M Construction Chemicals, Inc.
 - c. "Confilm," Master Builders, Inc.
- K. Underlayment Compound: Free-flowing, self-leveling, pumpable, cement-based compound for applications from one inch thick to feathered edges.
1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. "K-15," Ardex, Inc.
 - b. "Conflow," Conspec Marketing and Mfg. Co.
 - c. "LevelLayer II," Dayton Superior Corp.
 - d. "Flo-Top," Euclid Chemical Co.
 - e. "Levelex," L&M Construction Chemicals, Inc.
 - f. "Pourcrete," Master Builders, Inc.
 - g. "Stoncrete UL1," Stonhard, Inc.
 - h. "Thoro Underlayment Self-Leveling," Thoro System Products.
- L. Bonding Compound: Polyvinyl acetate or acrylic base.
1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. Polyvinyl Acetate (Interior Only):
 - 1) "Superior Concrete Bonder," Dayton Superior Corp.

- 2) "Euco Weld," Euclid Chemical Co.
- 3) "Weld-Crete," Larsen Products Corp.
- 4) "Everweld," L&M Construction Chemicals, Inc.

b. Acrylic or Styrene Butadiene:

- 1) "Acrylic Bondcrete," The Burke Co.
- 2) "Strongbond," Conspec Marketing and Mfg. Co.
- 3) "Day-Chem Ad Bond," Dayton Superior Corp.
- 4) "SBR Latex," Euclid Chemical Co.
- 5) "Daraweld C," W.R. Grace & Co.
- 6) "Hornweld," A.C. Horn, Inc.
- 7) "Everbond," L & M Construction Chemicals, Inc.
- 8) "Acryl-Set," Master Builders Inc.
- 9) "Intralok," W.R. Meadows, Inc.
- 10) "Sonocrete," Sonneborn-Rexnord.
- 11) "Stonlock LB2," Stonhard, Inc.

M. Epoxy Adhesive: ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material "Type," "Grade," and "Class" to suit project requirements.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

- a. "Burke Epoxy M.V.," The Burke Co.
- b. "Spec-Bond 100," Conspec Marketing and Mfg. Co.
- c. "Euco Epoxy System #452 or #620," Euclid Chemical Co.
- d. "Epoxite Binder 2390," A.C. Horn, Inc.
- e. "Epabond," L&M Construction Chemicals, Inc.
- f. "Concresive 1001," Master Builders, Inc.
- g. "Sikadur 32 Hi-Mod," Sika Corp.

2.5 PROPORTIONING AND DESIGN OF MIXES

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method is used, use an independent testing facility acceptable to Contracting Officer's Representative for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing.

1. Limit use of fly ash to not exceed 25 percent of cement content by weight.

B. Submit written reports to Contracting Officer's Representative of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until proposed mix designs have been reviewed by Contracting Officer's Representative.

C. Design mixes to provide normal weight concrete with the following properties, as indicated on drawings and schedules:

1. 4000-psi, 28-day compressive strength; W/C ratio, 0.44 maximum (non-air-entrained), 0.35 maximum (air-entrained).

D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Contracting Officer's Representative. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Contracting Officer's Representative before using in work.

2.6 ADMIXTURES

A. Use water-reducing admixture or high-range water-reducing admixture (Superplasticizer) in concrete as required for placement and workability.

B. Use nonchloride accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F (10 deg C).

C. Use high-range water-reducing admixture (HRWR) in pumped concrete, concrete for industrial slabs, architectural concrete, parking structure slabs, concrete required to be watertight, and concrete with water/cement ratios below 0.50.

- D. Use air-entraining admixture in exterior exposed concrete unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus or minus 1-1/2 percent within following limits:
 - 1. Concrete structures and slabs exposed to freezing and thawing, deicer chemicals, or hydraulic pressure:
 - a. 4.5 percent (moderate exposure); 5.5 percent (severe exposure) 1-1/2-inch max. aggregate.
 - 2. Other concrete (not exposed to freezing, thawing, or hydraulic pressure) or to receive a surface hardener: 2 percent to 4 percent air.
- E. Use admixtures for water reduction and set control in strict compliance with manufacturer's directions.
- F. Water-Cement Ratio: Provide concrete for following conditions with maximum water-cement (W/C) ratios as follows:
 - 1. Subjected to freezing and thawing; W/C 0.45.
 - 2. Subjected to deicers/watertight; W/C 0.40.
 - 3. Subjected to brackish water, salt spray, or deicers; W/C 0.40.
- G. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:
 - 1. Ramps, slabs, and sloping surfaces: Not more than 3 inches.
 - 2. Reinforced foundation systems: Not less than 1 inch and not more than 3 inches.
 - 3. Concrete containing HRWR admixture (Superplasticizer): Not more than 8 inches after addition of HRWR to site-verified 2-inch to 3-inch slump concrete.
 - 4. Other concrete: Not more than 4 inches.

2.7 CONCRETE MIXING

- A. Job-Site Mixing: Mix materials for concrete in appropriate drum-type batch machine mixer. For mixers of one cu. yd. or smaller capacity, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released. For mixers of capacity larger than one cu. yd., increase minimum 1-1/2 minutes of mixing time by 15 seconds for each additional cu. yd. or fraction thereof.
- B. Provide batch ticket for each batch discharged and used in work, indicating project identification name and number, date, mix type, mix time, quantity, and amount of water introduced.
- C. Ready-Mix Concrete: Comply with requirements of ASTM C 94, and as specified.
 - 1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 GENERAL

- A. Coordinate the installation of joint materials and vapor retarders with placement of forms and reinforcing steel.

3.2 FORMS

- A. General: Design, erect, support, brace, and maintain formwork to support vertical and lateral, static and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances complying with ACI 347.
- B. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent leakage of cement paste.
- C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.

- D. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- E. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- F. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
- G. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed. Retighten forms and bracing before concrete placement as required to prevent mortar leaks and maintain proper alignment.

3.3 VAPOR RETARDER/BARRIER INSTALLATION

- A. General: Following leveling and tamping of granular base for slabs on grade, place vapor retarder/barrier sheeting with longest dimension parallel with direction of pour.
- B. Lap joints 6 inches and seal vapor barrier joints with manufacturers' recommended mastic and pressure-sensitive tape.
- C. After placement of vapor retarder/barrier, cover with sand cushion and compact to depth as shown on drawings.

3.4 PLACING REINFORCEMENT

- A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as herein specified.
 - 1. Avoiding cutting or puncturing vapor retarder during reinforcement placement and concreting operations.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Contracting Officer's Representative.
- D. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.5 JOINTS

- A. Construction Joints: Locate and install construction joints as indicated or, if not indicated, locate so as not to impair strength and appearance of the structure, as acceptable to Contracting Officer's Representative.
- B. Provide keyways at least 1-1/2 inches deep in construction joints in walls and slabs and between walls and footings. Accepted bulkheads designed for this purpose may be used for slabs.
- C. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as otherwise indicated. Do not continue reinforcement through sides of strip placements.
- D. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.
- E. Isolation Joints in Slabs-on-Ground: Construct isolation joints in slabs-on-ground at points of contact between slabs-on-ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as indicated.
 - 1. Joint filler and sealant materials are specified in Division 7 Sections of these specifications.
- F. Contraction (Control) Joints in Slabs-on-Ground: Construct contraction joints in slabs-on-ground to form panels of patterns as shown. Use saw cuts 1/8 inch wide by 1/4 slab depth or inserts 1/4 inch wide by 1/4 of slab depth, unless otherwise indicated.

1. Form contraction joints by inserting premolded plastic, hardboard, or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.
2. Contraction joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.
3. If joint pattern is not shown, provide joints not exceeding 15 feet in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).
4. Joint sealant material is specified in Division 7 Sections of these specifications.

3.6 INSTALLATION OF EMBEDDED ITEMS

- A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto.
- B. Install reglets to receive top edge of foundation sheet waterproofing and to receive thru-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.
- C. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to obtain required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.7 PREPARATION OF FORM SURFACES

- A. General: Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound before reinforcement is placed.
- B. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.
- C. Coat steel forms with a nonstaining, rust-preventative material. Rust-stained steel formwork is not acceptable.

3.8 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work.
- B. General: Comply with ACI 304, "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete," and as herein specified.
- C. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete that has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete to avoid segregation at its final location.
- D. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
 1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309.
 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.
- E. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
 1. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Bring slab surfaces to correct level with straightedge and strike off. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
 3. Maintain reinforcing in proper position during concrete placement.

- F. Cold-Weather Placing: Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
- G. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
 - 1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 2. Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
- H. Hot-Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.
 - 1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F (32 deg C). Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.
 - 2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
 - 3. Fog spray forms, reinforcing steel, and subgrade just before concrete is placed.
 - 4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, when acceptable to Contracting Officer's Representative.

3.9 FINISH OF FORMED SURFACES

- A. Rough Form Finish: For formed concrete surfaces not exposed to view in the finish work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.
- B. Smooth Form Finish: For formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or other similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.
- C. Smooth Rubbed Finish: Provide smooth rubbed finish to scheduled concrete surfaces, which have received smooth form finish treatment, not later than one day after form removal.
 - 1. Moisten concrete surfaces and rub with carborundum brick or other abrasive until a uniform color and texture is produced. Do not apply cement grout other than that created by the rubbing process.
- D. Grout-Cleaned Finish: Provide grout-cleaned finish to scheduled concrete surfaces that have received smooth form finish treatment.
 - 1. Combine one part portland cement to 1-1/2 parts fine sand by volume, and a 50:50 mixture of acrylic or styrene butadiene-based bonding admixture and water to consistency of thick paint. Blend standard portland cement and white portland cement, amounts determined by trial patches, so that final color of dry grout will match adjacent surfaces.
 - 2. Thoroughly wet concrete surfaces, apply grout to coat surfaces, and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.
- E. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 MONOLITHIC SLAB FINISHES

- A. Scratch Finish: Apply scratch finish to monolithic slab surfaces to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated.
- B. After placing slabs, plane surface to tolerances for floor flatness (Ff) of 15 and floor levelness (Fl) of 13. Slope surfaces

uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms, or rakes.

- C. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and as otherwise indicated.
 - 1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to tolerances of Ff 18 - Fl 15. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
- D. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating system.
 - 1. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to tolerances of Ff 20 - Fl 17. Grind smooth surface defects that would telegraph through applied floor covering system.
- E. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.
- F. Nonslip Broom Finish: Apply nonslip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
 - 1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Contracting Officer's Representative before application.
- G. Nonslip Aggregate Finish: Apply nonslip aggregate finish to concrete stair treads, platforms, ramps, sloped walks, and elsewhere as indicated.
- H. After completion of float finishing and before starting trowel finish, uniformly spread 25 lbs. of dampened nonslip aggregate per 100 sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface. After broadcasting and tamping, apply trowel finishing as herein specified.
- I. After curing, lightly work surface with a steel wire brush, or an abrasive stone, and water to expose nonslip aggregate.

3.11 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply in accordance with manufacturer's instructions after screeding and bull floating, but before power floating and troweling.
- B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.
- C. Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, as herein specified.
- D. Provide moisture curing by following methods.
 - 1. Keep concrete surface continuously wet by covering with water.
 - 2. Use continuous water-fog spray.
 - 3. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4-inch lap over adjacent absorptive covers.
- E. Provide moisture-cover curing as follows:
 - 1. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width

with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

- F. Provide curing and sealing compound to exposed interior slabs and to exterior slabs, walks, and curbs as follows:
 - 1. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - 2. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.
- G. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
- H. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces, by application of appropriate curing method.
- I. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise directed.

3.12 REMOVAL OF FORMS

- A. General: Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.
- B. Form-facing material may be removed 4 days after placement only if shores and other vertical supports have been arranged to permit removal of form-facing material without loosening or disturbing shores and supports.

3.13 REUSE OF FORMS

- A. Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces except as acceptable to Contracting Officer's Representative.

3.14 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.
- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads and landings and associated items. Cast-in safety inserts and accessories as shown on drawings. Screed, tamp, and finish concrete surfaces as scheduled.
- E. Reinforced Masonry: Provide concrete grout for reinforced masonry lintels and bond beams where indicated on drawings and as scheduled. Maintain accurate location of reinforcing steel during concrete placement.

3.15 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Contracting Officer's Representative.

1. Cut out honeycomb, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts, down to solid concrete but in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. Place patching mortar before bonding compound has dried.
 2. For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- B. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Contracting Officer's Representative. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry-pack mortar, or precast cement cone plugs secured in place with bonding agent.
1. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.
- C. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having required slope.
1. Repair finished unformed surfaces that contain defects that affect durability of concrete. Surface defects, as such, include crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets, and other objectionable conditions.
 2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
 3. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with patching compound. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Contracting Officer's Representative.
 4. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- D. Repair isolated random cracks and single holes not over 1 inch in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry-pack before bonding compound has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.
- E. Perform structural repairs with prior approval of Contracting Officer's Representative for method and procedure, using specified epoxy adhesive and mortar.
- F. Repair methods not specified above may be used, subject to acceptance of Contracting Officer's Representative.

3.16 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. General: The Government will employ a testing laboratory to perform tests and to submit test reports.
- B. Sampling and testing for quality control during placement of concrete may include the following, as directed by Contracting Officer's Representative.
- C. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
 1. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
 2. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231 pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
 3. Concrete Temperature: Test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27 deg C) and above, and each time a set of compression test specimens is made.
 4. Compression Test Specimen: ASTM C 31; one set of 4 standard cylinders for each compressive strength test,

unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cure test specimens are required.

5. Compressive Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yds. plus additional sets for each 50 cu. yds. more than the first 25 cu. yds. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
 6. When frequency of testing will provide fewer than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.
 7. When total quantity of a given class of concrete is less than 50 cu. yds., Contracting Officer's Representative may waive strength test if adequate evidence of satisfactory strength is provided.
 8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
 9. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 500 psi.
- D. Test results will be reported in writing to Contracting Officer's Representative, Structural Engineer, Ready-Mix Producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
- F. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Contracting Officer's Representative. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Contractor shall pay for such tests when unacceptable concrete is verified.

END OF SECTION 03300

SECTION 07900 - JOINT SEALERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Extent of each form and type of joint sealer is indicated on drawings and schedules.
- B. This Section includes joint sealers for the following locations:
 - 1. Exterior joints in horizontal traffic surfaces as indicated below:
 - a. Control, expansion, and isolation joints in cast-in-place concrete paving.
 - b. Joints between different materials listed above.
 - c. Other joints as indicated.

1.3 SYSTEM PERFORMANCES

- A. Provide joint sealers that have been produced and installed to establish and maintain watertight and airtight continuous seals.

1.4 SUBMITTALS

- A. Product Data from manufacturers for each joint sealer product required, including instructions for joint preparation and joint sealer application.
- B. Samples for Initial Selection Purposes: Manufacturer's standard bead samples consisting of strips of actual products showing full range of colors available, for each product exposed to view.
- C. Compatibility and adhesion test reports from elastomeric sealant manufacturer indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants. Include sealant manufacturer's interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.

1.5 QUALITY ASSURANCE

- A. Single Source Responsibility for Joint Sealer Materials: Obtain joint sealer materials from a single manufacturer for each different product required.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials in compliance with manufacturers' recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.7 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with installation of joint sealers under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturers.
 - 2. When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturer or below 40 deg F (4.4 deg C).
 - 3. When joint substrates are wet due to rain, frost, condensation, or other causes.
- B. Joint Width Conditions: Do not proceed with installation of joint sealers where joint widths are less than allowed by joint sealer manufacturer for application indicated.

- C. Joint Substrate Conditions: Do not proceed with installation of joint sealers until contaminants capable of interfering with their adhesion are removed from joint substrates.

1.8 SEQUENCING AND SCHEDULING

- A. Sequence installation of joint sealers to occur not less than 21 nor more than 30 days after completion of waterproofing, unless otherwise indicated.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors: Provide color of exposed joint sealers indicated or, if not otherwise indicated, as selected by Contracting Officer's Representative from manufacturer's standard colors.

2.2 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C 920 requirements, including those referenced for Type, Grade, Class, and Uses.

2.3 JOINT SEALANTS FOR PAVING

- A. Two-Part Jet-Fuel-Resistant Cold-Applied Sealant: Manufacturer's standard, pourable, chemically curing, elastomeric sealant complying with FS SS-S-200 and of the following formulation for base polymer.
 - 1. Urethane formulation complying with FS TT-S-00227, with maximum movement capability of plus or minus 12-1/2 percent.
 - 2. Coal-tar-modified polymer formulation complying with ASTM C 920 for Type M, Grade P, Class 25, Uses T and O as applicable to joint substrates indicated.
 - 3. Bitumen-modified urethane formulation.
- B. One-Part Jet-Fuel-Resistant Cold-Applied Urethane Sealant: Manufacturer's standard, pourable, coal-tar modified urethane formulation complying with performance requirements of FS SS-S-200, Type H.
- C. One-Part Jet-Fuel-Resistant Silicone Sealant: Manufacturer's standard, pumpable, low-modulus nonacid-curing silicone sealant complying with ASTM C 920 for Type S; Grade NS; Class 25; Uses T, M and, as applicable to joint substrates of concrete highways and concrete runways of airports subject to jet fuel exposure, O; and complying with the following requirements:
 - 1. Additional capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the following percentage changes in joint width as measured at time of application and remain in compliance with other requirements of ASTM C 920 for Uses indicated:
 - a. 50 percent movement in extension and 50 percent movement in compression for a total of 100 percent movement
 - 2. Accepted for use in concrete highway and airport runway joints per FAA Engineering Brief No. 36, May 21, 1986.
- D. Hot-Poured Jet-Fuel-Resistant Elastomeric Sealant: Manufacturer's standard, one-part, concrete joint sealant complying with ASTM D 3569.
- E. Hot-Poured Elastomeric Sealant: Manufacturer's standard, one-part, concrete joint sealant complying with ASTM D 3406.
- F. Hot-Poured Elastomeric Sealant for Concrete and Asphalt Pavements: Manufacturer's standard sealant for concrete and asphalt pavement joints complying with ASTM D 3405.
- G. Available Products: Subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to, the following:

H. Products: Subject to compliance with requirements, provide one of the following:

1. Two-Part Jet-Fuel-Resistant Cold-Applied Sealant:
 - a. "Vulkem 202"; Mameco International, Inc.
 - b. "Gardox"; W.R. Meadows, Inc.
 - c. "Urexpan NR-300"; Pecora Corp.
 - d. "Sonomeric CT 2"; Sonneborn Building Products Div., Rexnord Chemical Products Inc.
2. One-Part Jet-Fuel-Resistant Cold-Applied Sealant:
 - a. "Vulkem 200"; Mameco International, Inc.
 - b. "Sonomeric CT 1"; Sonneborn Building Products Div., Rexnord Chemical Products Inc.
3. One-Part Jet-Fuel-Resistant Silicone Sealant:
 - a. "Dow Corning 888"; Dow Corning Corp.
4. Hot-Poured Jet-Fuel-Resistant Elastomeric Sealant:
 - a. "Poly-Jet JFR"; W.R. Meadows, Inc.
5. Hot-Poured Elastomeric Sealant:
 - a. "Poly-Jet JFR"; W.R. Meadows, Inc.
6. Hot-Poured Elastomeric Sealant for Concrete and Asphalt Pavements:
 - a. "Hotpour Spec"; J. & P. Petroleum Products, Inc.
 - b. "Hi-Spec"; W.R. Meadows, Inc.

2.4 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material and type which are nonstaining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonwaxing, nonextruding strips of flexible, nongassing plastic foam of material indicated below; nonabsorbent to water and gas; and of size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
 1. Open-cell polyurethane foam for cold-applied sealants only.
 2. Closed-cell polyethylene foam.
 3. Either open-cell polyurethane foam or closed-cell polyethylene foam, unless otherwise indicated, subject to approval of sealant manufacturer, for cold-applied sealants only.
- C. Elastomeric Tubing Joint Fillers: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, capable of remaining resilient at temperatures down to -26 deg F (-15 deg C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.
- D. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.5 MISCELLANEOUS MATERIALS

- A. Primer: Provide type recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealer-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Provide nonstaining, chemical cleaners of type which are acceptable to manufacturers of sealants and sealant backing materials, which are not harmful to substrates and adjacent nonporous materials, and which do not leave oily residues or otherwise have a detrimental effect on sealant adhesion or in-service performance.
- C. Masking Tape: Provide nonstaining, nonabsorbent type compatible with joint sealants and to surfaces adjacent to joints.

- D. Accessory Materials for Fire-Stopping Sealants: Provide forming, joint fillers, packing and other accessory materials required for installation of fire-stopping sealants as applicable to installation conditions indicated.

2.6 JOINT FILLERS FOR CONCRETE PAVING

- A. General: Provide joint fillers of thickness and widths indicated.
- B. Self-Expanding Cork Joint Filler: Preformed strips complying with ASTM D 1752 for Type III.
- C. Cork Joint Filler: Preformed strips complying with ASTM D 1752 for Type II.
- D. Sponge Rubber Joint Filler: Preformed strips complying with ASTM D 1752 for Type I.
- E. Bituminous Fiber Joint Filler: Preformed strips of composition below, complying with ASTM D 1751:
 - 1. Asphalt saturated fiberboard.
 - 2. Granulated cork with asphalt binder encased between 2 layers of saturated felt or glass-fiber felt of width and thickness indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealers, with Installer present, for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealer performance. Do not proceed with installation of joint sealers until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:
 - 1. Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; old joint sealers; oil; grease; waterproofing; water repellants; water; surface dirt; and frost.
 - 2. Clean concrete, masonry, unglazed surfaces of ceramic tile and similar porous joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
 - 3. Remove laitance and form release agents from concrete.
 - 4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile; and other nonporous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.
- B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on preconstruction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer bond, do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALERS

- A. General: Comply with joint sealer manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B. Elastomeric Sealant Installation Standard: Comply with recommendations of ASTM C 962 for use of joint sealants as applicable to materials, applications and conditions indicated.
- C. Solvent-Release-Curing Sealant Installation Standard: Comply with requirements of ASTM C 804 for use of solvent-release-curing sealants.
- D. Latex Sealant Installation Standard: Comply with requirements of ASTM C 790 for use of latex sealants.

- E. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:
1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability.
 - a. Do not leave gaps between ends of joint fillers.
 - b. Do not stretch, twist, puncture, or tear joint fillers.
 - c. Remove absorbent joint fillers which have become wet prior to sealant application and replace with dry material.
 2. Install bond breaker tape between sealants and joint fillers, compression seals, or back of joints where adhesion of sealant to surfaces at back of joints would result in sealant failure.
 3. Install compressible seals serving as sealant backings to comply with requirements indicated above for joint fillers.
- F. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.
- G. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, and to comply with sealant manufacturer's directions for installation methods, materials, and tools which produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in conformance with sealant manufacturer's recommendations.
- H. Installation of Preformed Hollow Neoprene Gaskets: Install gaskets, with minimum number of end joints, in joint recesses with edges free of spalls and sides straight and parallel, both within tolerances specified by gasket manufacturer. Apply manufacturer's recommended adhesive to joint substrates immediately prior to installing gaskets. For straight sections provide gaskets in continuous lengths; where changes in direction occur, adhesively splice gasket together to provide watertight joint. Recess gasket below adjoining joint surfaces by 1/8 inch to 1/4 inch.

3.4 CLEANING

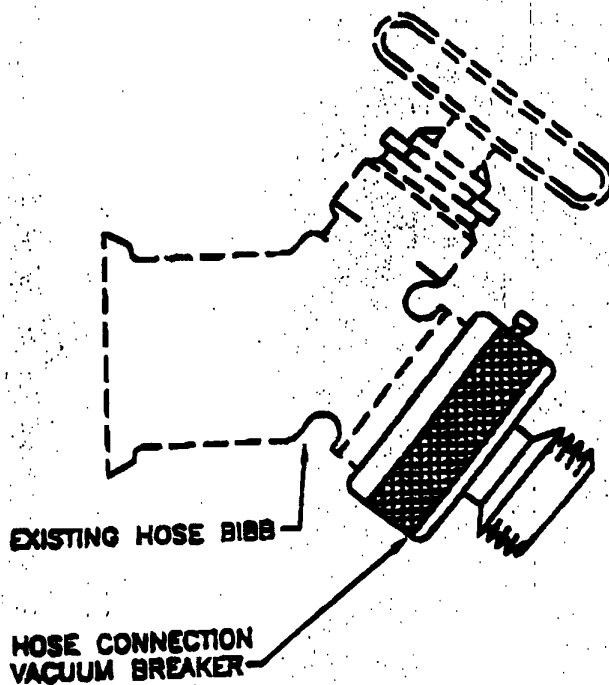
- A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.

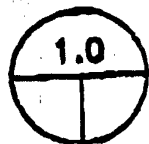
END OF SECTION 07900

DRAWINGS

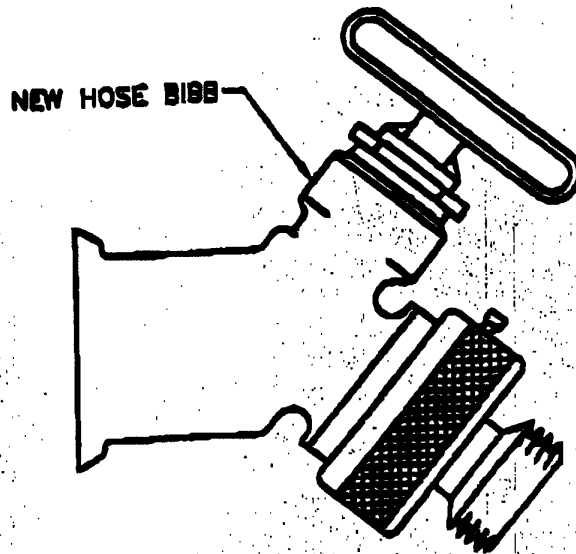


HOSE CONNECTION VACUUM BREAKER

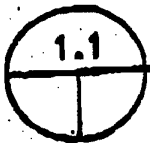
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Sequence No.
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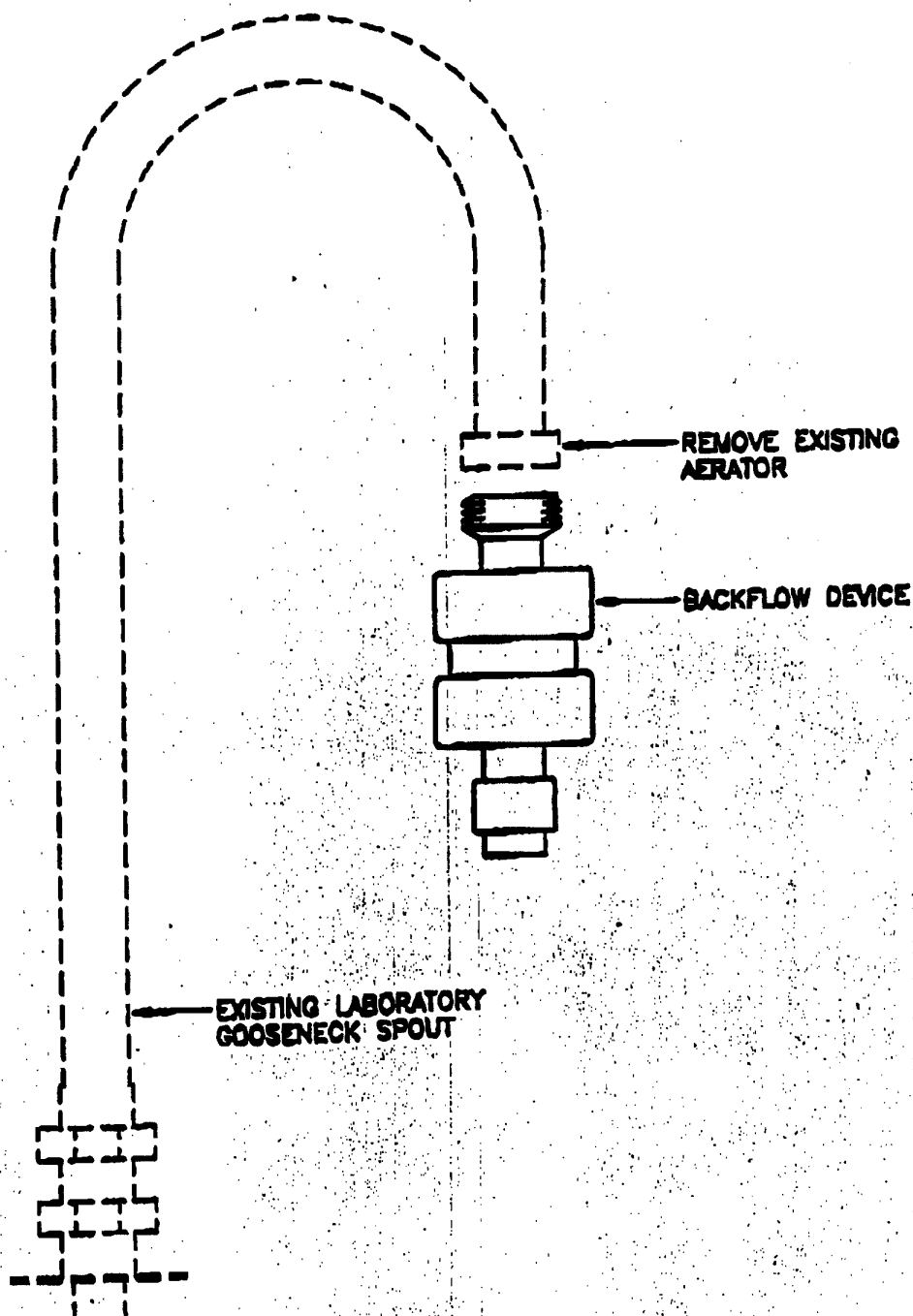


HOSE CONNECTION WITH VACUUM BREAKER

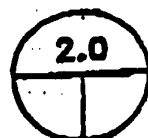


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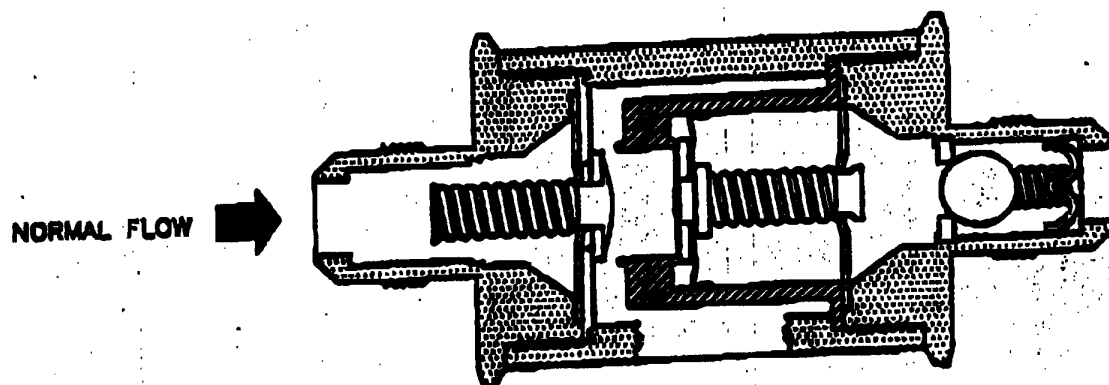
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2



**LABORATORY FAUCET BACKFLOW
DEVICE**
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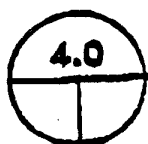
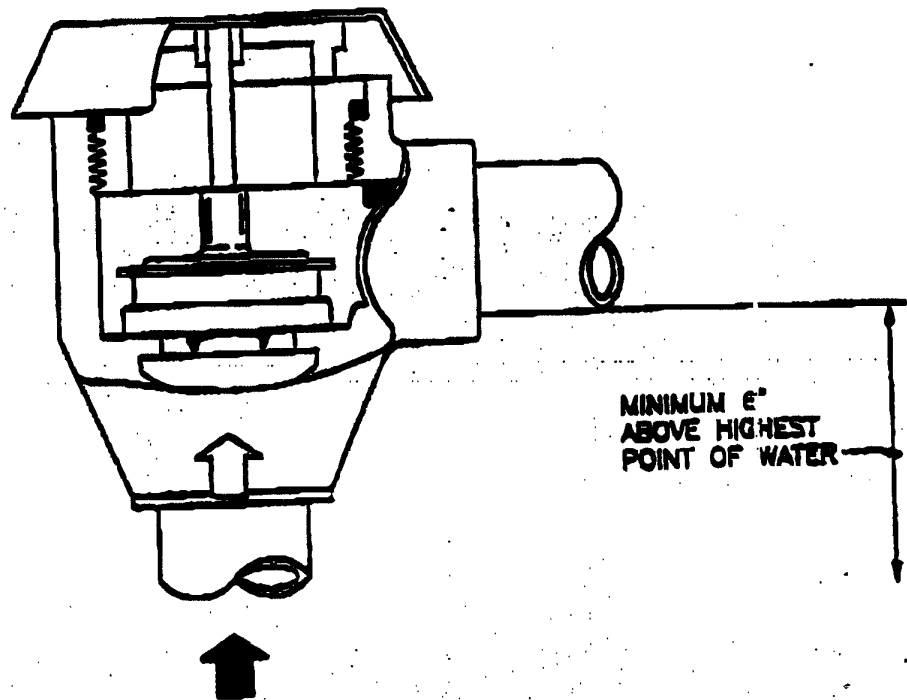
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VENDING MACHINE BACKFLOW DEVICE

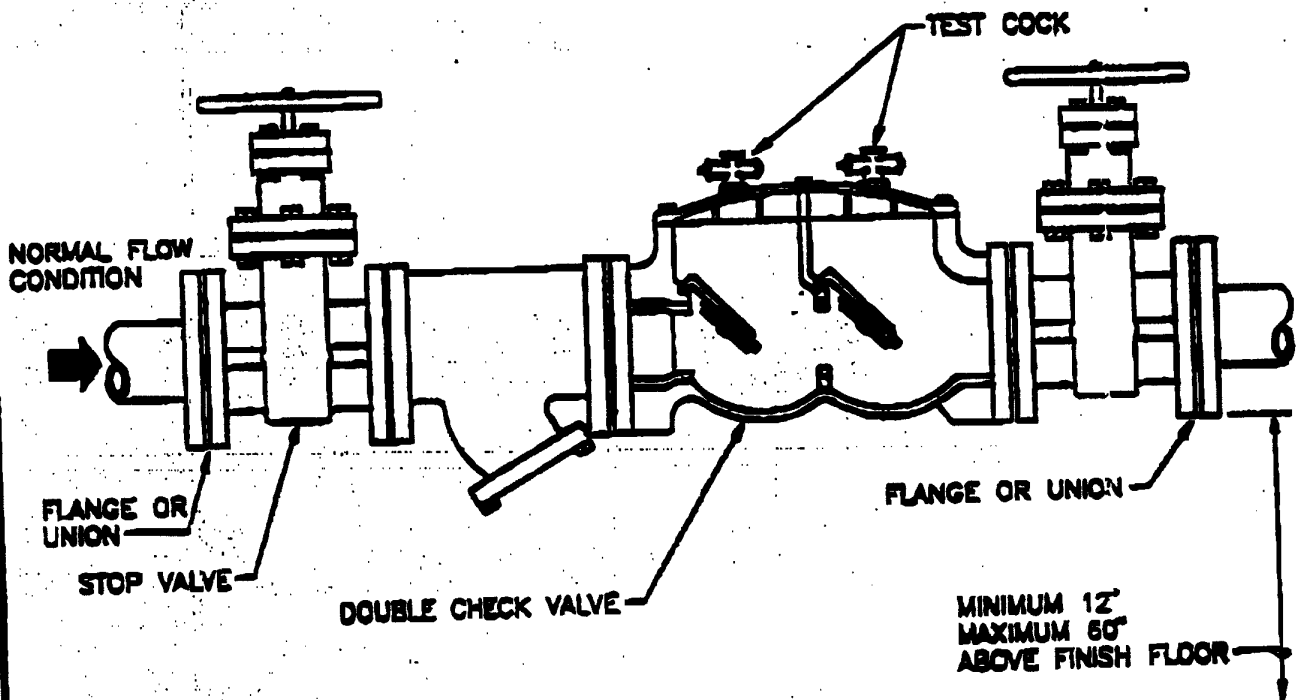
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4



ATMOSPHERIC VACUUM BREAKER
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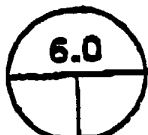
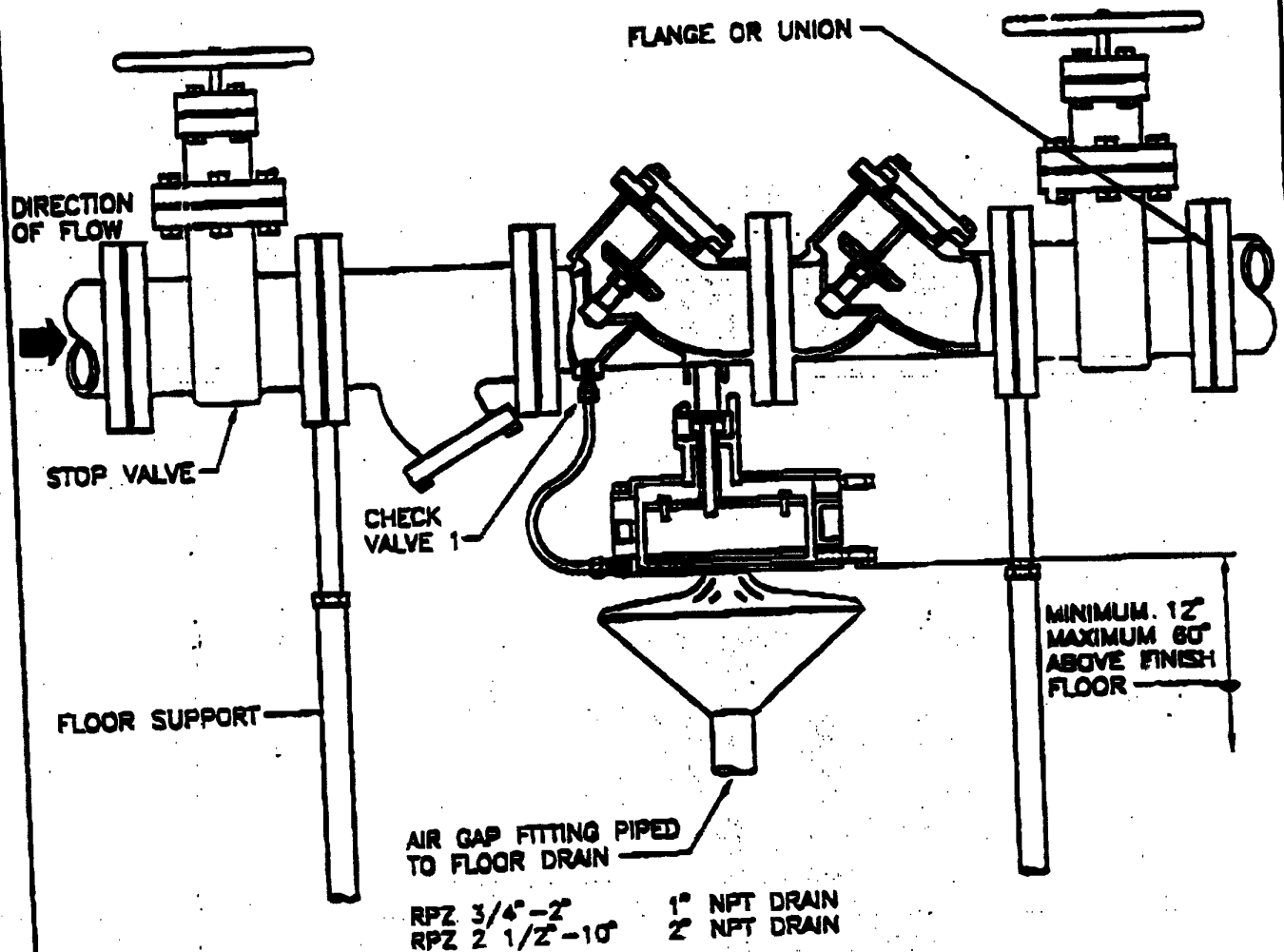
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4.0
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5



DOUBLE CHECK VALVE ASSEMBLY

NO SCALE

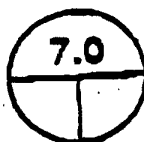
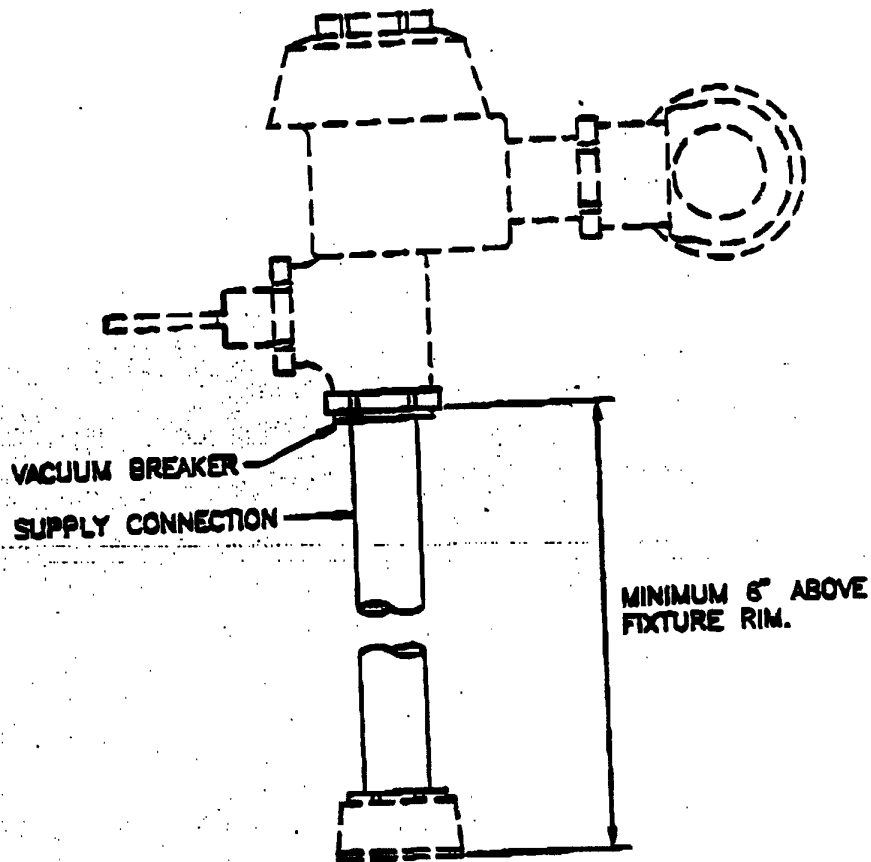
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REDUCED PRESSURE ZONE DEVICE

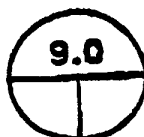
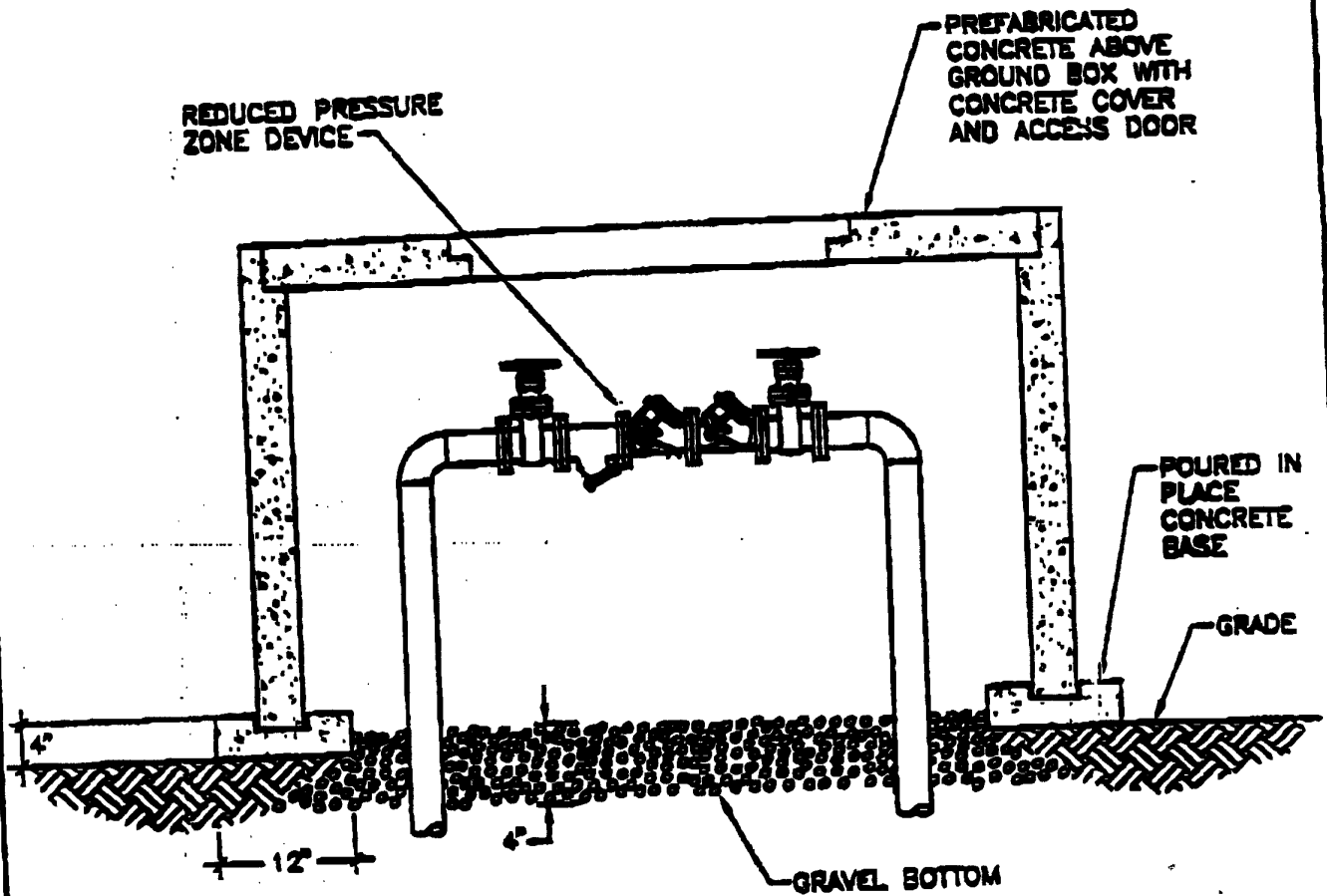
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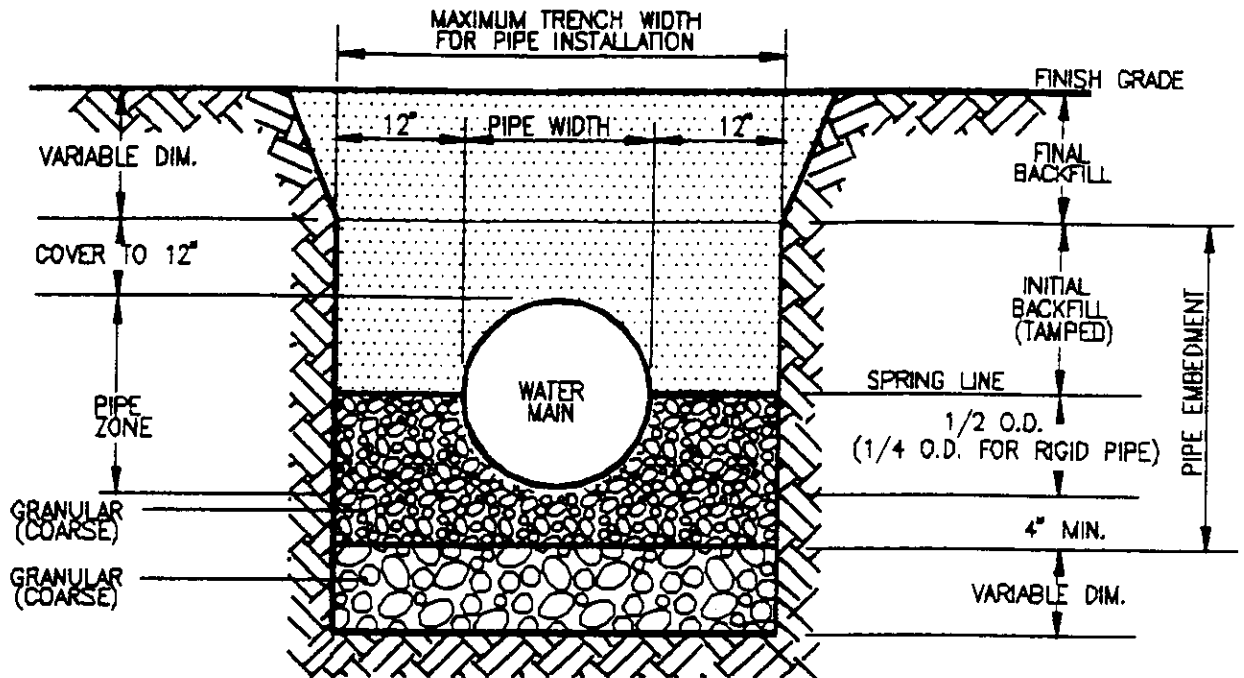
FLUSH VALVE VACUUM BREAKER
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Drawing No.
7.0
Sequence No.
8



CONCRETE VALVE BOX
NO SCALE

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9.0
Sequence No.
9



TYPICAL SECTION
NOT TO SCALE

NOTES:

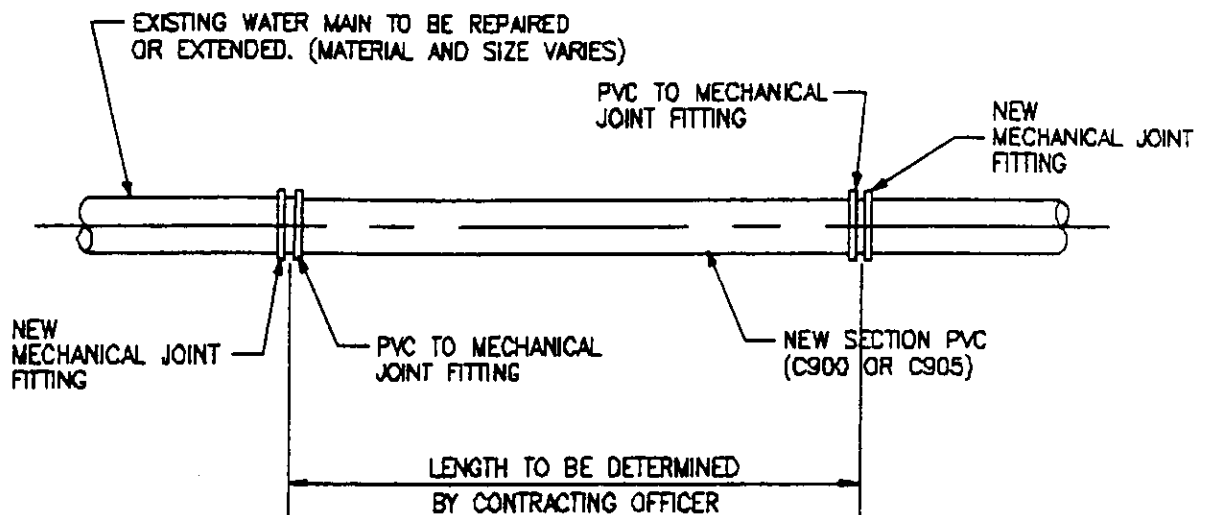
1. GRANULAR MATERIAL FOR BEDDING SHALL BE COMPOSED OF SOUND AND DURABLE PARTICLES OF CRUSHED AGGREGATE AND SHALL CONFORM TO THE GRADATION INDICATED BELOW. GRANULAR FILL SHALL BE PLACED IN NOT MORE THAN 6" LAYERS AND COMPACTED TO 95% DENSITY AS DETERMINED BY THE AASHTO METHOD T-99.
2. TAMPED BACKFILL SHALL BE FINELY DIVIDED JOB EXCAVATED MATERIAL FREE FROM DEBRIS, ORGANIC MATERIAL AND STONES COMPACTED TO 95% MAXIMUM DENSITY AS DETERMINED BY AASHTO STANDARD METHOD T-99. GRANULAR FILL MAY BE SUBSTITUTED FOR ALL OR PART OF TAMPED BACKFILL.
3. PIPE BEDDING SHALL BE PROVIDED IN ACCORDANCE WITH THESE MINIMUM STANDARDS OR MANUFACTURERS RECOMMENDED INSTALLATION PROCEDURE, WHICHEVER IS MORE STRINGENT.
4. IMPORTED BACKFILL SHALL BE PAID AT THE SPECIFIED UNIT RATE OR THE BID ITEM, AS APPLICABLE. WHICH VOLUME SHALL BE LIMITED BY THE MAXIMUM TRENCH WIDTH.
5. SEE PVC MARKING DETAIL, SHEET 3.

BEDDING GRADATION REQUIREMENTS:

3/4"	100%
1/2"	80 - 95%
3/8"	50 - 70%
#4 SIEVE	5 - 15%
#10 SIEVE	MIN. 5%

PAYMENT:
INCLUDED IN PIPE BID ITEM.

SYN. D.G. NO.	ACTION	DATE	DESCRIPTION OF REVISION
NTS, Incorporated ENGINEERS - ARCHITECTS PLANNERS - SURVEYORS		U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA	
DESIGNED BY: MA	REPAIR AND INSTALLATION OF WATER DISTRIBUTION LINES WATER PIPE EMBEDMENT - UNIMPROVED AREAS -		
DRAWN BY: MPS			
CHECKED BY: RT			
SUBMITTED BY:	SOL. NO.	DATE	NAT 98
(ENGINEER)	DATE	CONTR. # DCAW3-95-0-0084	SEQUENCE NO.
		SHEET NO. 1 OF 30	



PIPE REPAIR SECTION

NOT TO SCALE


NOTES:

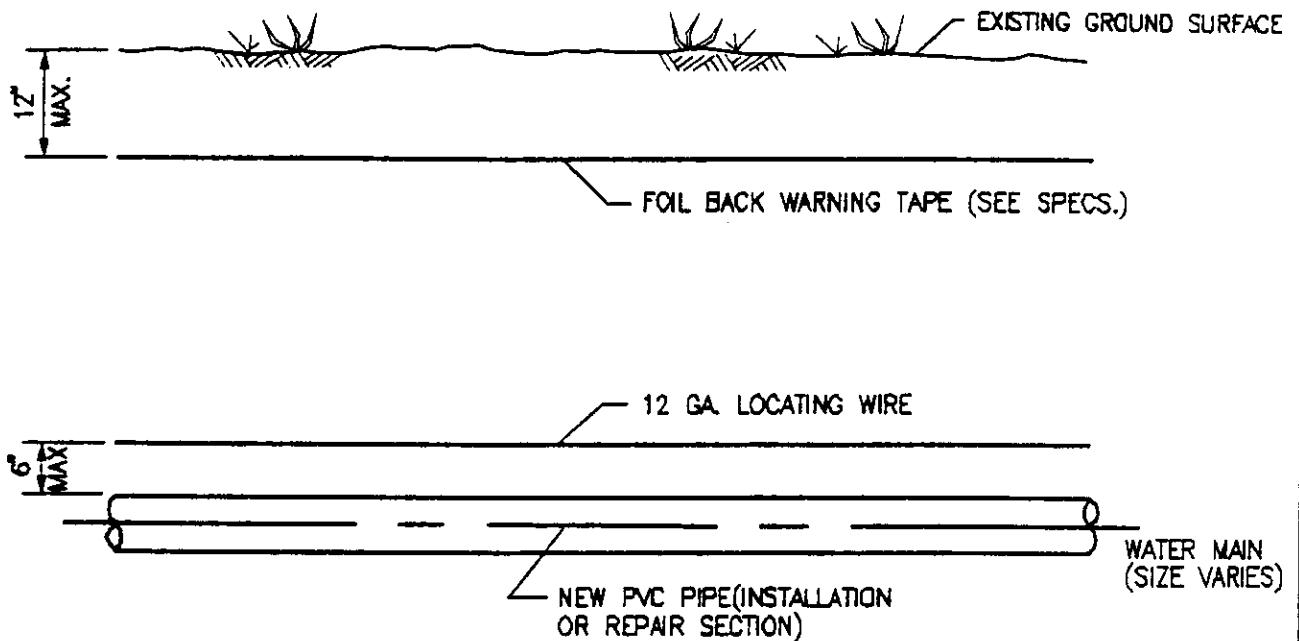
1. SAWCUT EXISTING PIPE FOR CLEAN, NEAT SURFACE FOR MECHANICAL JOINT INSTALLATIONS.
2. INSTALL PVC MARKING ITEMS AS PER DETAIL, SHEET 3.
3. DEAD END LINES TO HAVE ONE SET OF MECHANICAL JOINT FITTINGS BEFORE INSTALLING NEW PIPE SECTION.

PAYMENT:

PVC - PER LINEAR FOOT, INCLUDING BACKFILL AND MARKING SYSTEM.

FITTINGS - PER EACH. UNDER SEPERATE BID ITEM.

SYN	D.O.	NO.	ACTION	DATE	DESCRIPTION OF REVISION
 NTB, Incorporated ENGINEERS - ARCHITECTS PLANNERS - SURVEYORS					
U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA					
DESIGNED BY: MA			REPAIR AND INSTALLATION OF WATER DISTRIBUTION LINES PIPE REPAIR SECTION		
DRAWN BY: MFS					
CHECKED BY: RT					
SUBMITTED BY:			SOL. NO.		DATE MAY 96
(ENGINEER)			CONFR. #: D4G63-95-0-0064		SEQUENCE NO.
DATE			SHEET NO. 2 OF 30		




PVC MARKING DETAIL NOT TO SCALE

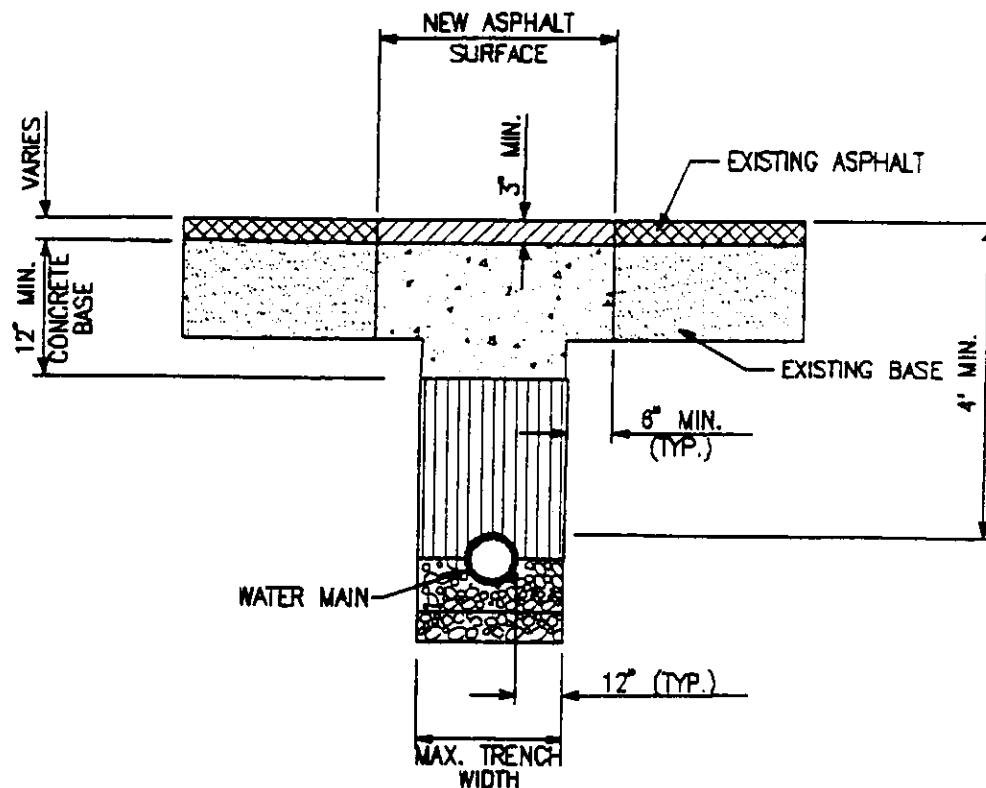
NOTES:

1. 12 GAUGE LOCATING WIRE SHALL BE CONTINUOUS ALONG PVC. WIRE SHALL BE EXTENDED TO SURFACE AT ALL ABOVE-GROUND FITTINGS, VALVES, ETC.
2. WARNING TAPE TO BE PLACED DIRECTLY ABOVE NEW PIPE SECTION.

PAYMENT:
INCIDENTAL, INCLUDED IN PIPE
BID ITEM.

SYN	D.C.	ADJ.	ACTION	DATE	DESCRIPTION OF REVISION
 NTB, Incorporated ENGINEERS • ARCHITECTS PLANNERS • SURVEYORS					U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA
DESIGNED BY: MAL	REPAIR AND INSTALLATION OF WATER DISTRIBUTION LINES				
SEALIN BY: MPS	PVC MARKING DETAIL				
CHECKED BY: RT					
SUBMITTED BY:	SOL. NO.	DATE: MAY 98			
	CONTR. #:	DACMS-95-0-0064	SEQUENCE NO.		
(ENGINEER)	DATE	SHEET NO. 3 OF 30			

FILENAME: 45_003



PAVEMENT REPLACEMENT DETAIL (ASPHALT)
NOT TO SCALE

NOTES:

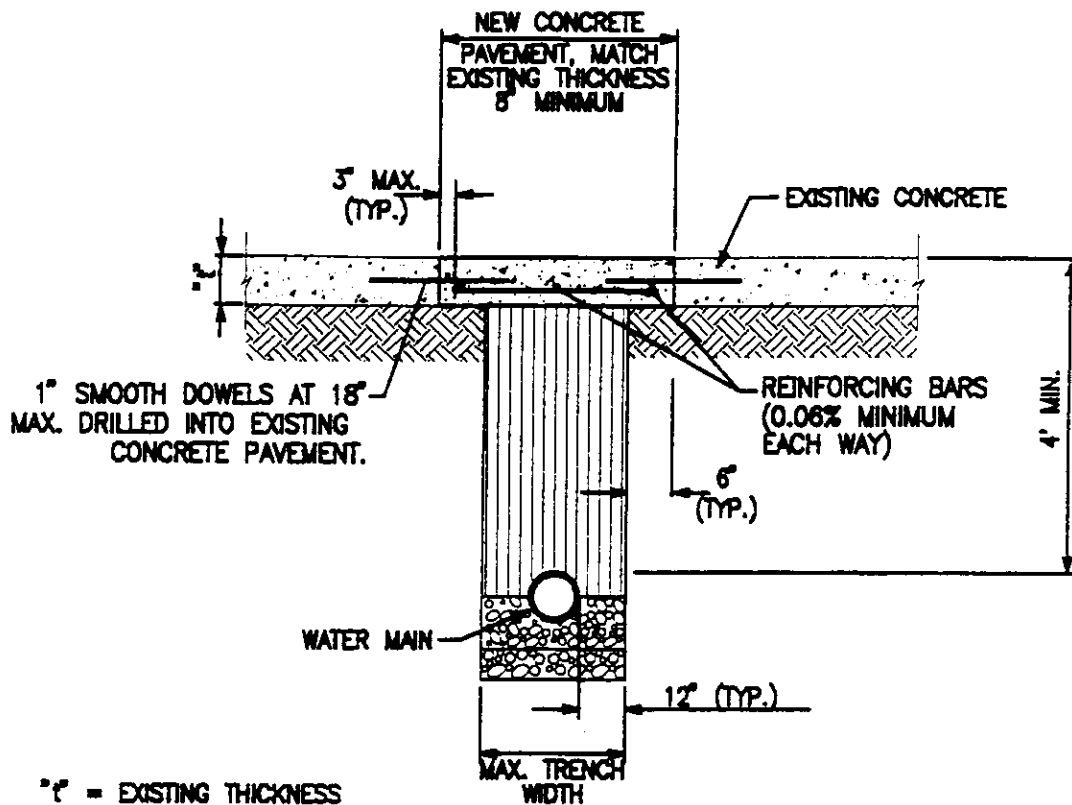
1. SAWCUT ASPHALT FULL DEPTH TO PROVIDE NEAT LINES FOR REMOVAL.
2. SEE PVC MARKING DETAIL, SHEET 3.
3. FOR MAXIMUM TRENCH WIDTH, SEE SHEET 1.
4. FOR EMBEDMENT, SEE SHEET 1.
5. MATCH EXISTING ASPHALT THICKNESS WITH MINIMUM 3" PROVIDED.

PAYMENT:

ASPHALT - BASED ON MAXIMUM TRENCH WIDTH, PER TON.
CONCRETE BASE - BASED ON MAXIMUM TRENCH WIDTH, PER CUBIC YARD.
PVC & BACKFILL - INCLUDED IN PIPE BID ITEM.

NTB, Incorporated ENGINEERS - ARCHITECTS PLANNERS - SURVEYORS		U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA	
DESIGNED BY: MAW		REPAIR AND INSTALLATION OF WATER DISTRIBUTION LINES PAVEMENT REPLACEMENT DETAIL (ASPHALT)	
DRAWN BY: MFS		SOL. NO. _____ DATE: MAY 88	
CHECKED BY: RT		CONTR. # DAC63-85-0-0084	
SUBMITTED BY: _____		SHEET NO. 4 OF 30	
ENGINEER: _____ DATE: _____		SEQUENCE NO. _____	

FILENAME: 45..004



PAVEMENT REPLACEMENT DETAIL (CONCRETE)
NOT TO SCALE


NOTES:

1. SAWCUT CONCRETE FULL DEPTH TO PROVIDE NEAT LINES FOR REMOVAL.
2. SEE PVC MARKING DETAIL, SHEET 3.
3. FOR MAXIMUM TRENCH WIDTH, SEE SHEET 1.
4. FOR EMBEDMENT, SEE SHEET 1.

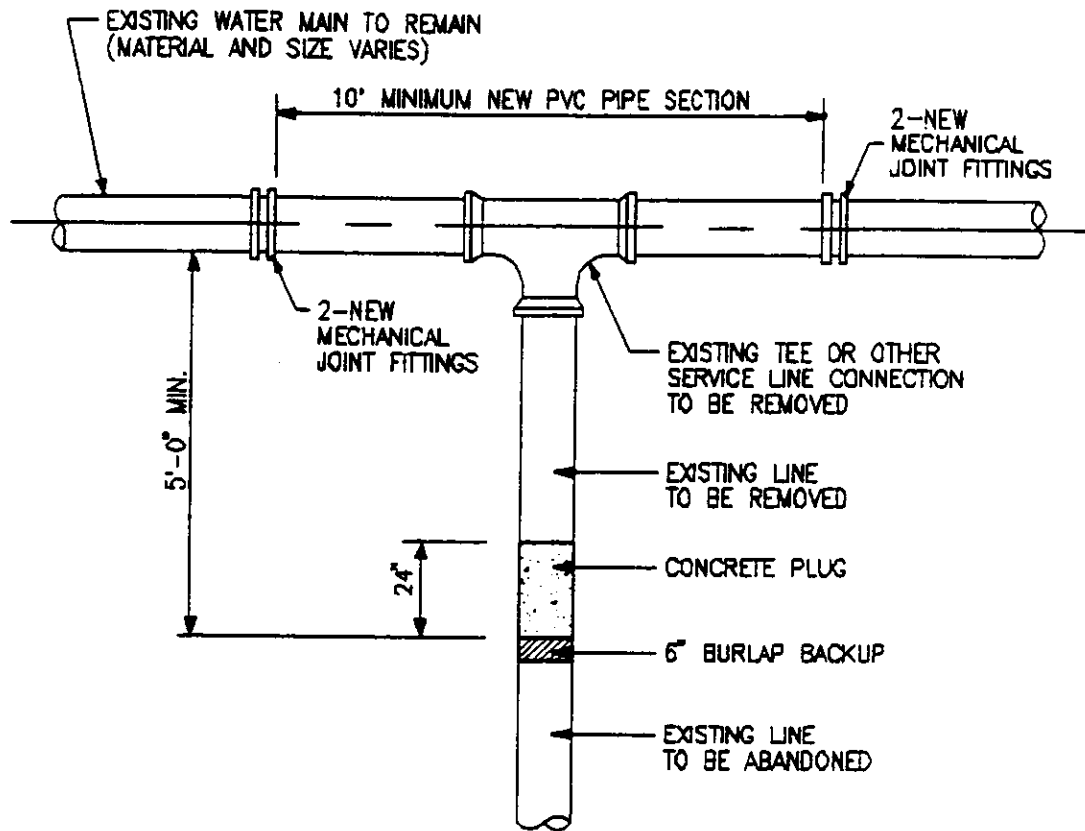
PAYMENT:

CONCRETE - BASED ON MAXIMUM TRENCH WIDTH, PER CUBIC YARD.

PVC & BACKFILL - INCLUDED IN PIPE BID ITEM.

SYM.	D.G.	NO.	ACTION	DATE	DESCRIPTION OF REVISION
 NTB, Incorporated ENGINEERS - ARCHITECTS PLANNERS - SURVEYORS					U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA
REPAIR AND INSTALLATION OF WATER DISTRIBUTION LINES PAVEMENT REPLACEMENT DETAIL (CONCRETE)					
DESIGNED BY: MAJ			SOL. NO.		
DRAWN BY: NFS			DATE: MAY 98		
CHECKED BY: RT			CONTR. #: DAC463-98-0-0064		
SUBMITTED BY:			SHEET NO. 5 OF 30		
(ENGINEER)			SEQUENCE NO.		

FILENAME: 45_005



PLUG AND ABANDON EXISTING WATER MAIN

(ALL SIZES)

NOT TO SCALE

NOTES:

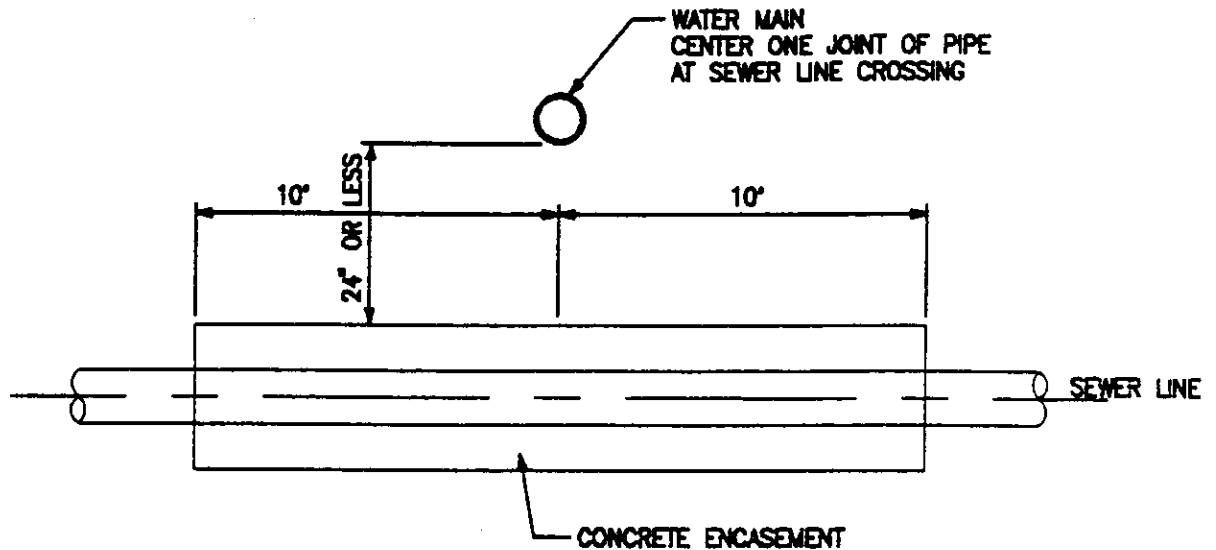
1. CUT ABANDONED PIPE SECTION AND PLUG.
2. CUT OUT EXISTING TEE OR CONNECTION TO EXISTING MAIN AND INSTALL NEW PVC SECTION WITH MECHANICAL JOINT FITTINGS.

PAYMENT:

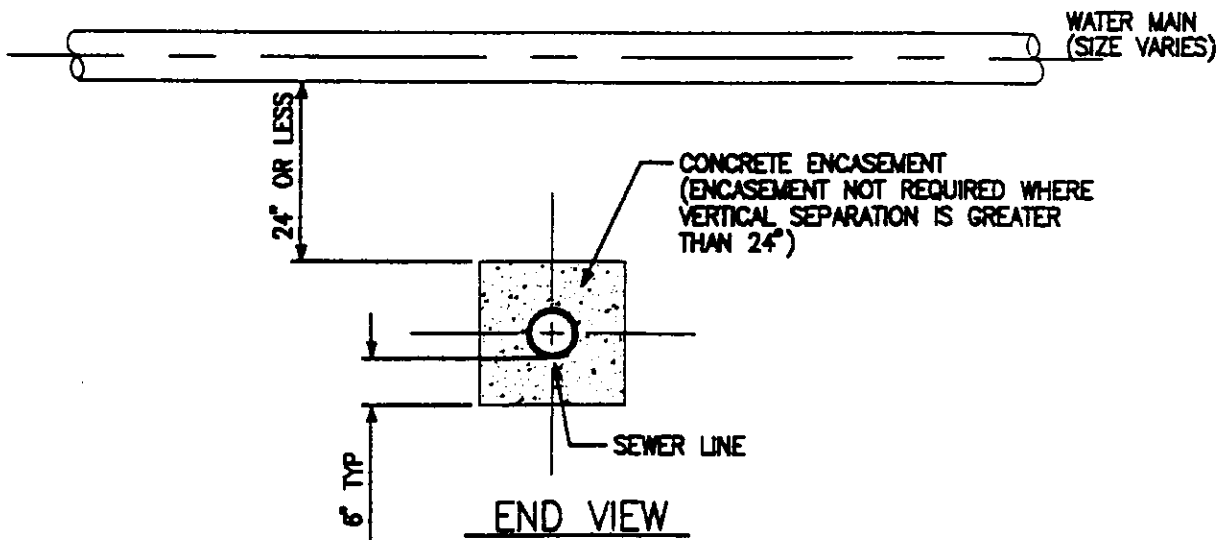
SHALL BE PER EACH FOR ALL SIZES AND INCLUDE ALL ITEMS NEEDED TO COMPLETE THE ABANDONMENT.

SYN. D.D. NO.	ACTION	DATE	DESCRIPTION OF ACTION
NTB, Incorporated ENGINEERS • ARCHITECTS PLANNERS • SURVEYORS			U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FCRT POLK, LOUISIANA
DESIGNED BY MAJ	REPAIR AND INSTALLATION OF WATER DISTRIBUTION LINES PLUG AND ABANDON EXISTING WATER MAIN		
DRAWN BY BSC			
CHECKED BY RT			
SUBMITTED BY:		SOL. NO.	DATE: MAY 86
(ENGINEER) DATE		CONTR. #: DACAB1-95-0-0084	SEQUENCE NO.
		SHEET NO. 1 OF 30	

FILENAME: 45_008




SIDE VIEW

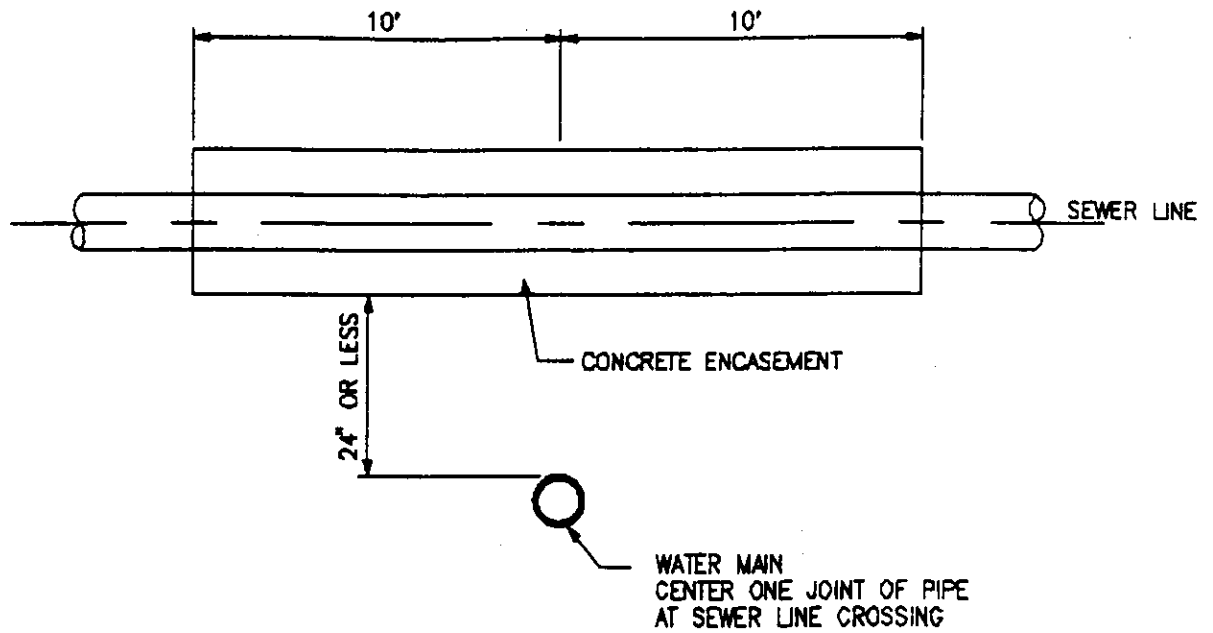


END VIEW

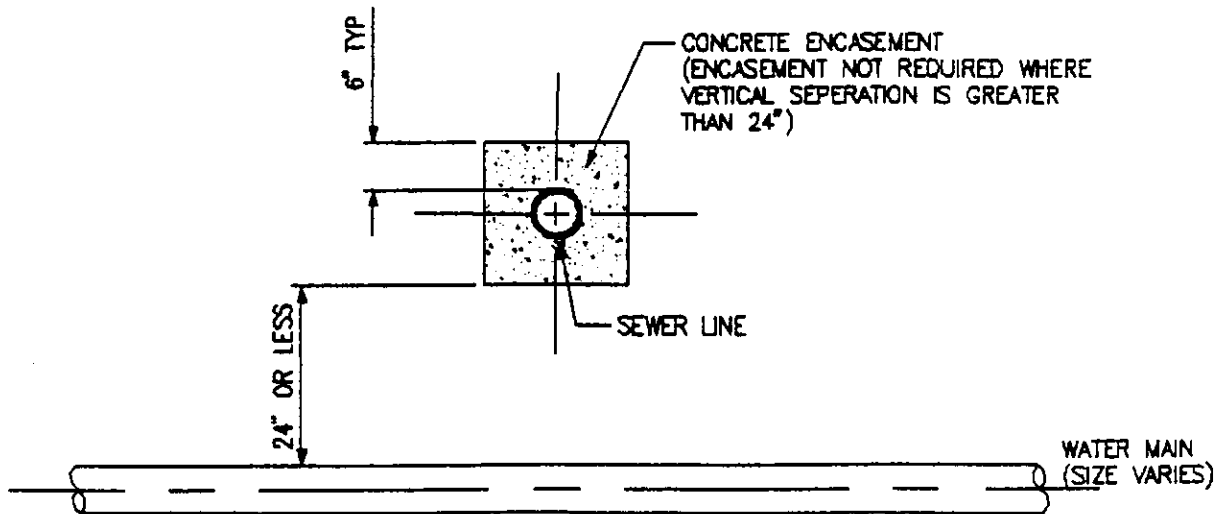
WATER MAIN ABOVE SEWER LINE
NOT TO SCALE

PAYMENT:
CONCRETE ENCASEMENT OF SEWER LINE SHALL BE
PER LINEAR FOOT BASED ON ENCASEMENT DETAIL.

BYN (D.O. NO.)	ACTION	DATE	DESCRIPTION OF REVISION
 NTB, Incorporated ENGINEERS • ARCHITECTS PLANNERS • SURVEYORS			U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA
DESIGNED BY: NAJ	REPAIR AND INSTALLATION OF WATER DISTRIBUTION LINES CONCRETE ENCASEMENT DETAILS - 1 OF 2		
DRAWN BY: MFS			
CHECKED BY: RT			
SUBMITTED BY:	SOL. NO.	DATE: MAY 96	
(ENGINEER)	DATE	CONTR. #: DAC463-95-0-0084	SEQUENCE NO.
		SHEET NO. 7 OF 30	



SIDE VIEW




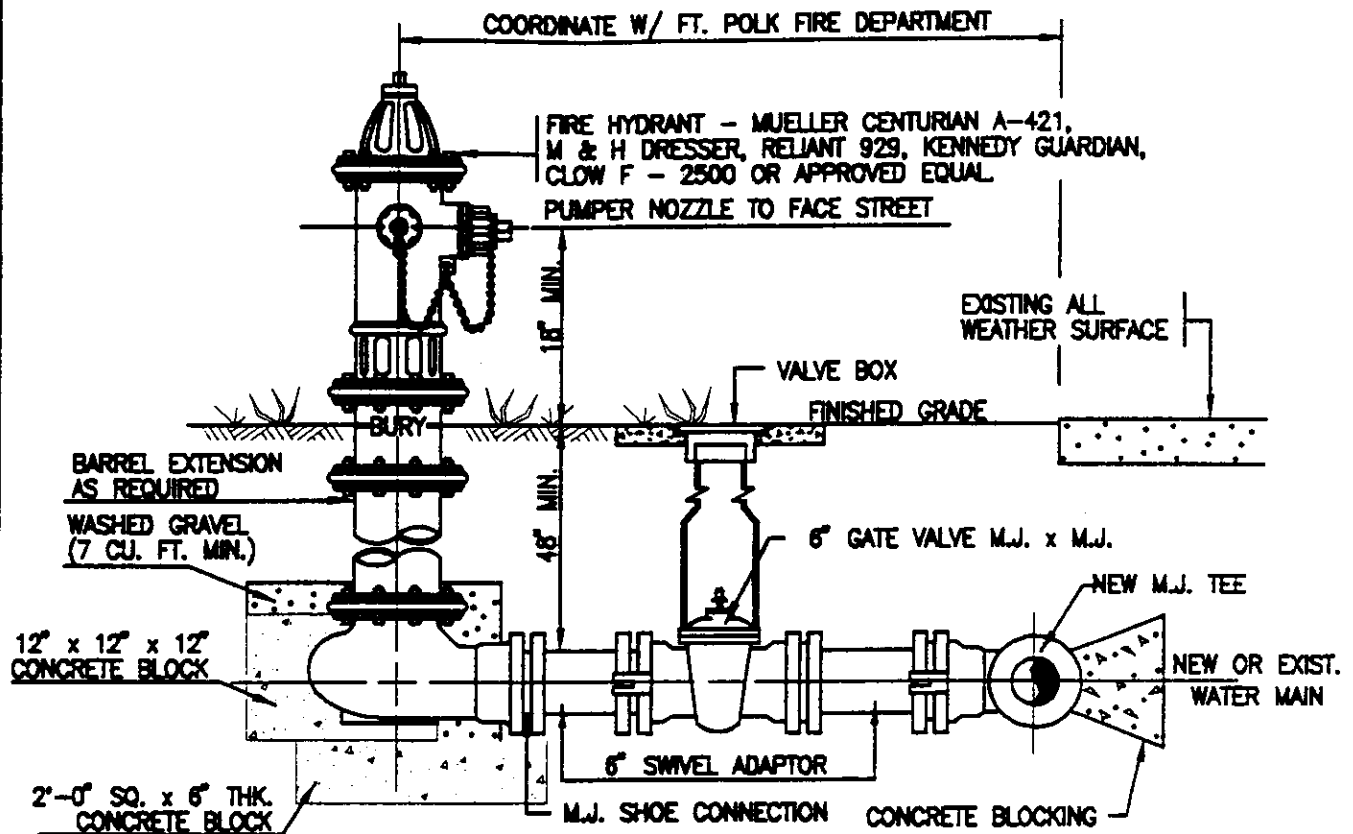
END VIEW

SEWER LINE ABOVE WATER MAIN
NOT TO SCALE

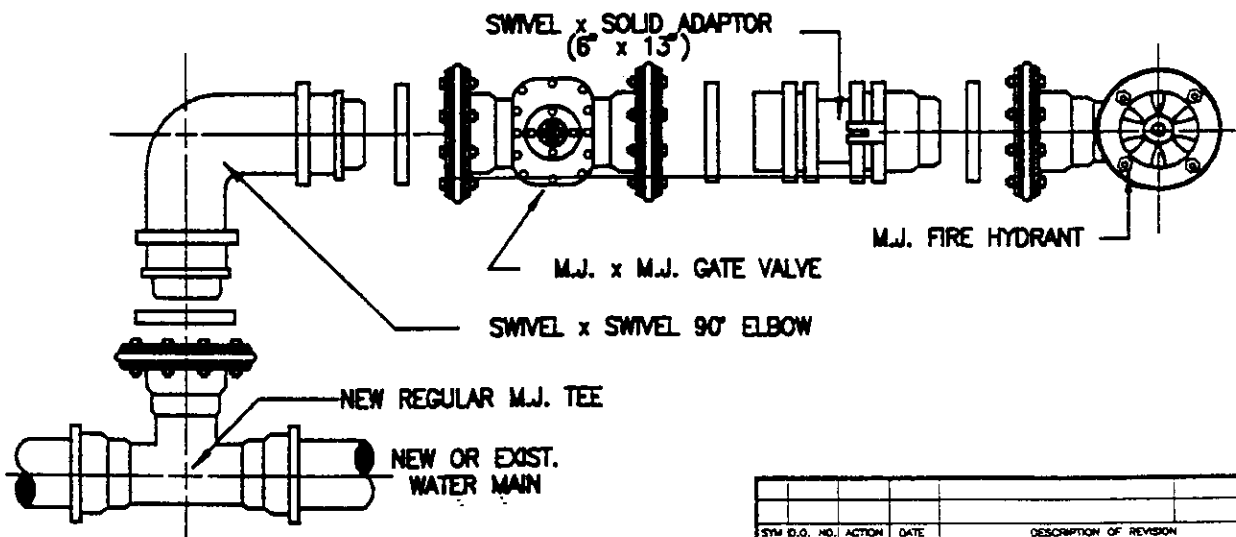
PAYMENT:

CONCRETE ENCASEMENT OF SEWER LINE SHALL BE
PER LINEAR FOOT BASED ON ENCASEMENT DETAIL.

REV	NO.	NO.	ACTION	DATE	DESCRIPTION OF REVISION
 NTB, Incorporated ENGINEERS • ARCHITECTS PLANNERS • SURVEYORS					
U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA					
DESIGNED BY: MAI		REPAIR AND INSTALLATION OF WATER DISTRIBUTION LINES CONCRETE ENCASEMENT DETAILS - 2 OF 2			
CHECKED BY: WFS					
DRAWN BY: RT					
SUBMITTED BY:					
(ENGINEER)		DATE	SOL. NO.	DATE: MAY 95	SEQUENCE NO.
			CONTR. #: DAC43-95-D-0064	SHEET NO. 8 OF 30	



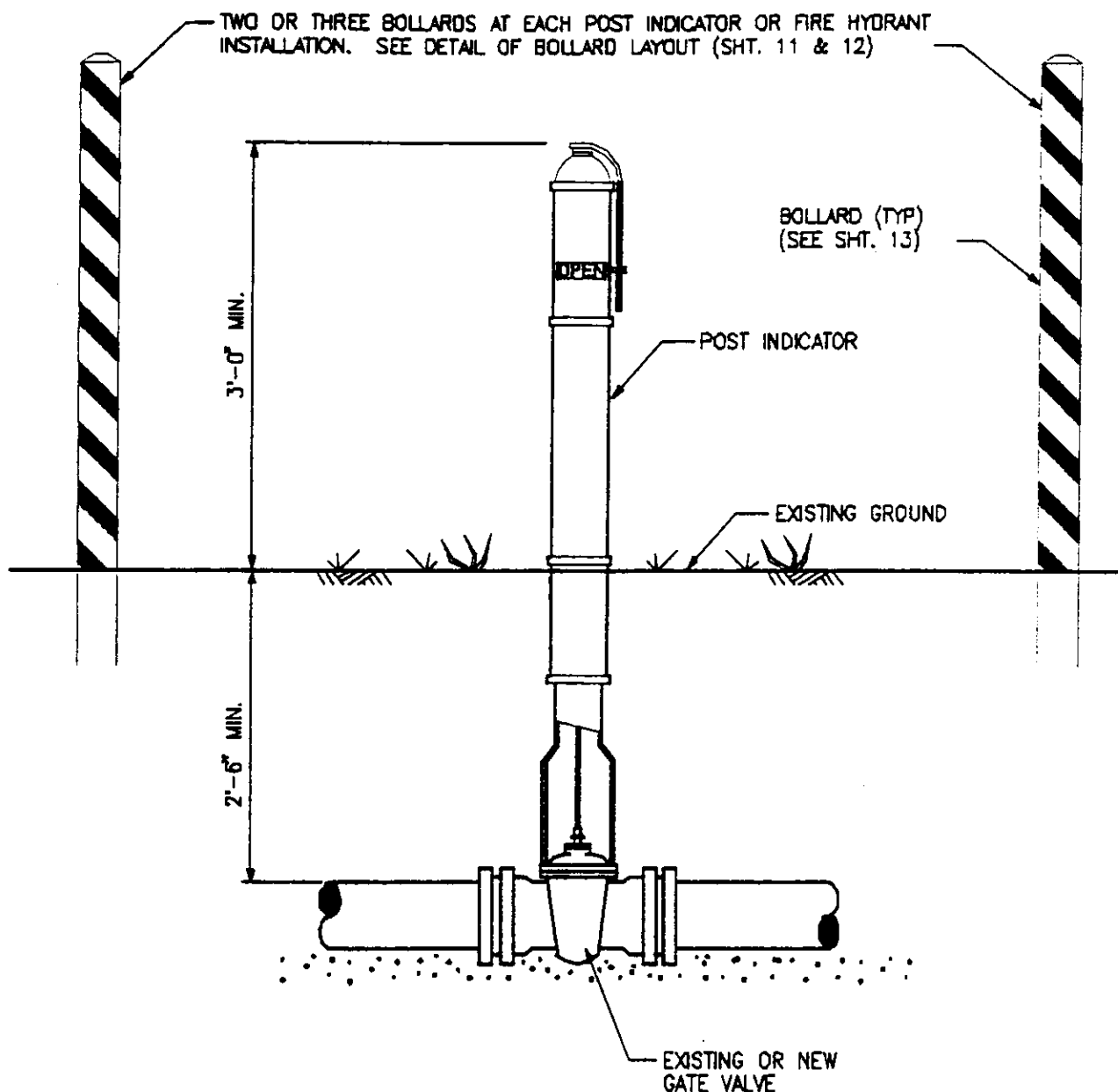
SECTION DETAIL OF HYDRANT CONNECTION
WITH VALVE



FIRE HYDRANT
INSTALLED W/SWIVEL FITTINGS

PAYMENT:
FIRE HYDRANT ASSEMBLY INCLUDES ALL PIPING, FITTINGS,
AND CONNECTIONS FOR A COMPLETE INSTALLATION.
FIRE HYDRANT INCLUDES ALL PIPING AND CONNECTIONS
FROM THE SHOE TO THE HYDRANT.


SYM	D.O.	NO.	ACTION	DATE	DESCRIPTION OF REVISION
NTB, Incorporated ENGINEERS • ARCHITECTS PLANNERS • SURVEYORS					
U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA					
DESIGNED BY:	REPAIR AND INSTALLATION OF				
MAJ	WATER DISTRIBUTION LINES				
DRAWN BY:	FIRE HYDRANT ASSEMBLY				
MFS					
CHECKED BY:					
RT					
SUBMITTED BY:	SOL. NO.	DATE:	MAY 96		
(ENGINEER)	DATE	CONTR. #:	DACA63-95-0-0064	SEQUENCE NO.	
		SHEET NO.	9	OF	30

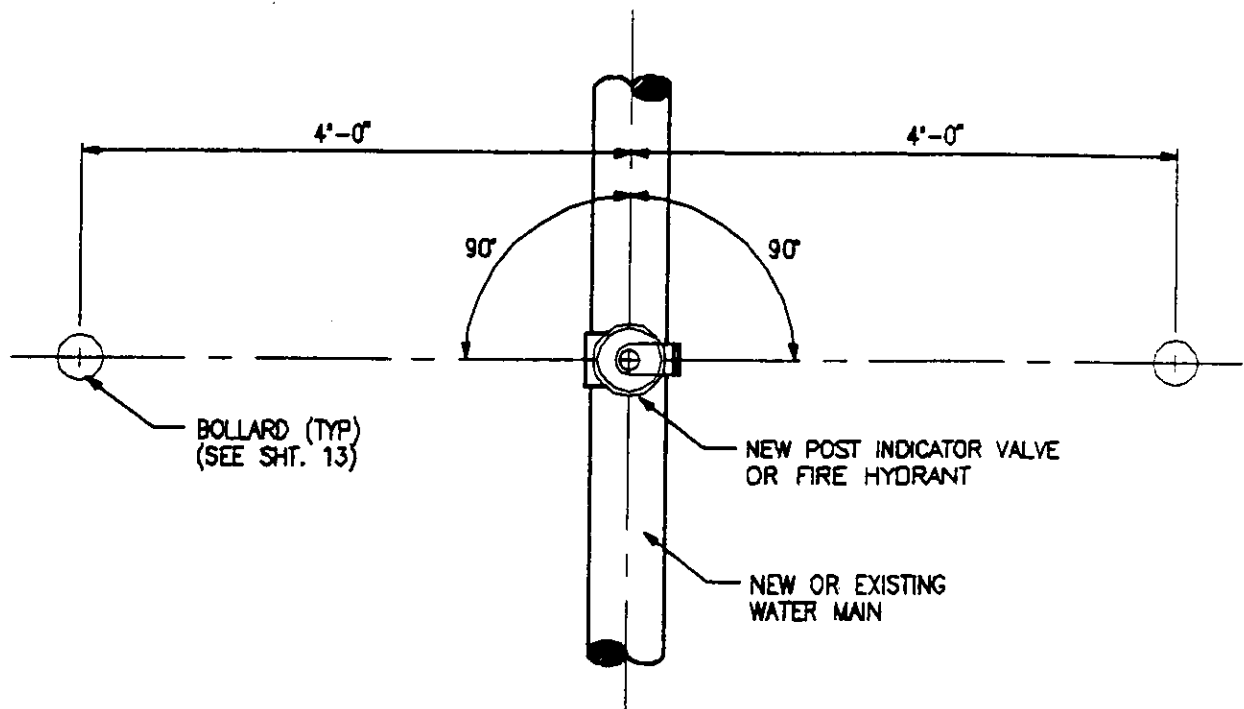


POST INDICATOR VALVE DETAIL
NOT TO SCALE


PAYMENT:

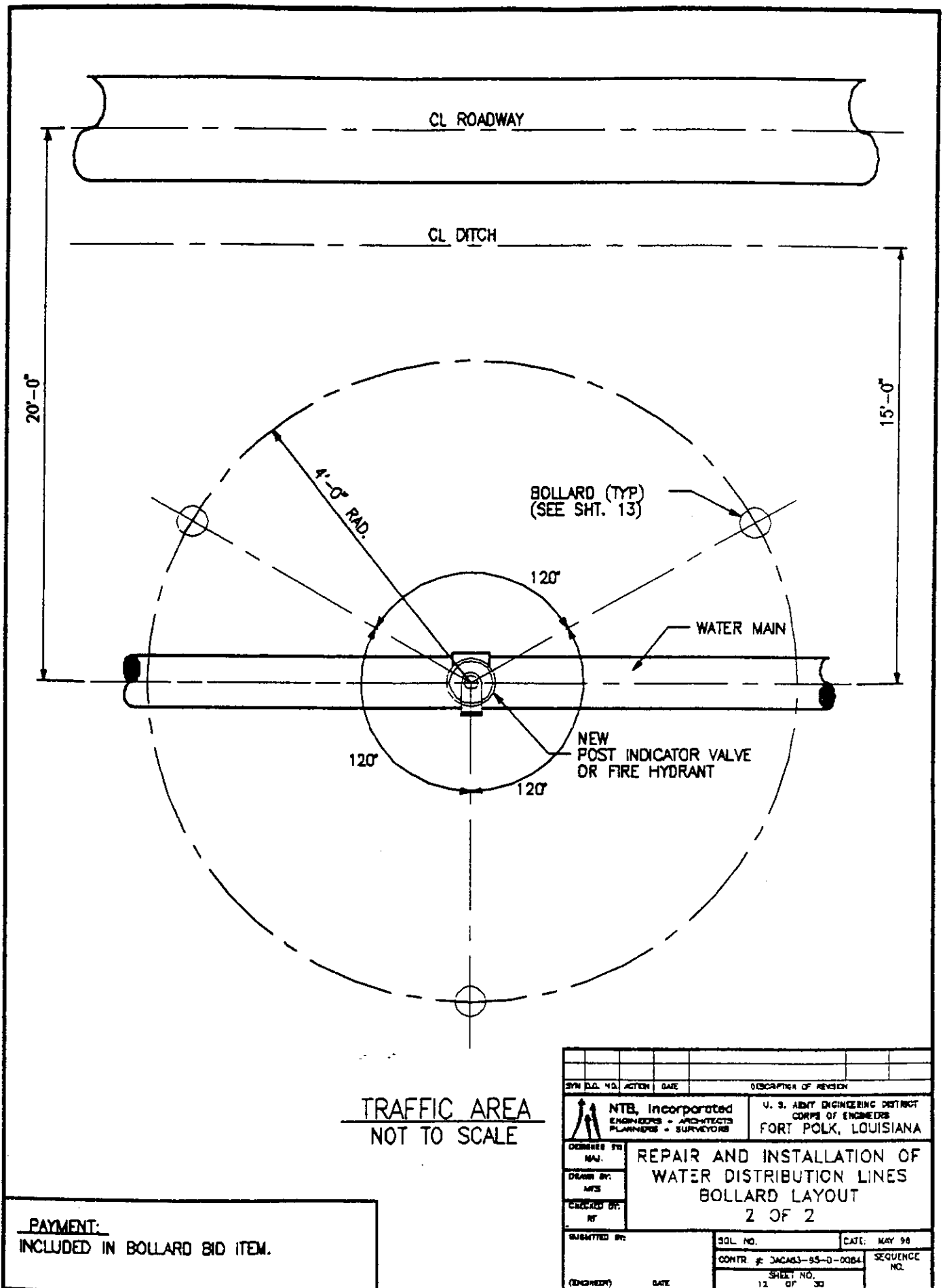
- BOLLARDS ARE INCLUDED AS A SEPARATE BID ITEM.
- GATE VALVES ARE INCLUDED AS A SEPARATE BID ITEM.
- POST INDICATOR SHALL BE PER EACH AND INCLUDE ALL FITTINGS, CONNECTIONS, AND OTHER ITEMS REQUIRED FOR A COMPLETE INSTALLATION.

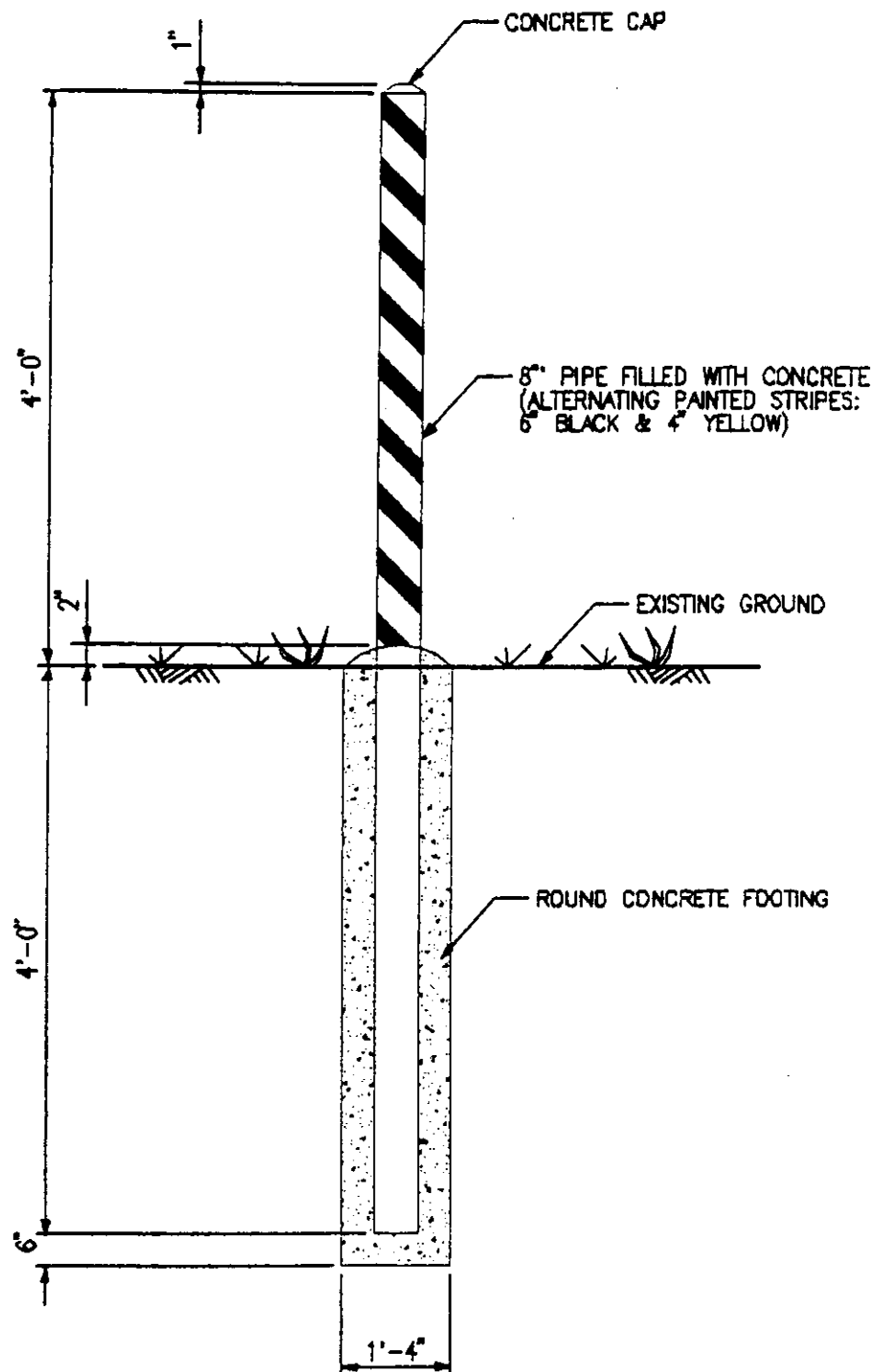
BY: J.D. NOLAN		DATE: 5/88	
ACTION: 1		DESCRIPTION OF REVISION:	
 NTS, Incorporated ENGINEERS - ARCHITECTS PLANNERS - SURVEYORS		U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA	
DESIGNED BY:	REPAIR AND INSTALLATION OF		
DRAWN BY:	WATER DISTRIBUTION LINES		
CHECKED BY:	POST INDICATOR		
DATE:	VALVE DETAIL		
SUBMITTED BY:	SOL. NO.	DATE:	MAY 88
(ENGINEER)	DATE:	CONTR. # JAC/83-95-0-0084	SEQUENCE NO.
		SHEET NO. 10	OF 30



PAYMENT:
INCLUDED IN BOLLARD BID ITEM.

SYN	NO.	ACTION	DATE	DESCRIPTION OF REVISION
 NTB, Incorporated ENGINEERS - ARCHITECTS PLANNERS - SURVEYORS				U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA
DESIGNED BY	REPAIR AND INSTALLATION OF WATER DISTRIBUTION LINES BOLLARD LAYOUT			
DRAWN BY	1 OF 2			
CHECKED BY				
SUBMITTED BY	SOL. NO.	DATE: MAY 98	SEQUENCE NO.	
(ENGINEER)	DATE	CONTR. # JAC63-98-0-0064	SHEET NO. 11 OF 30	

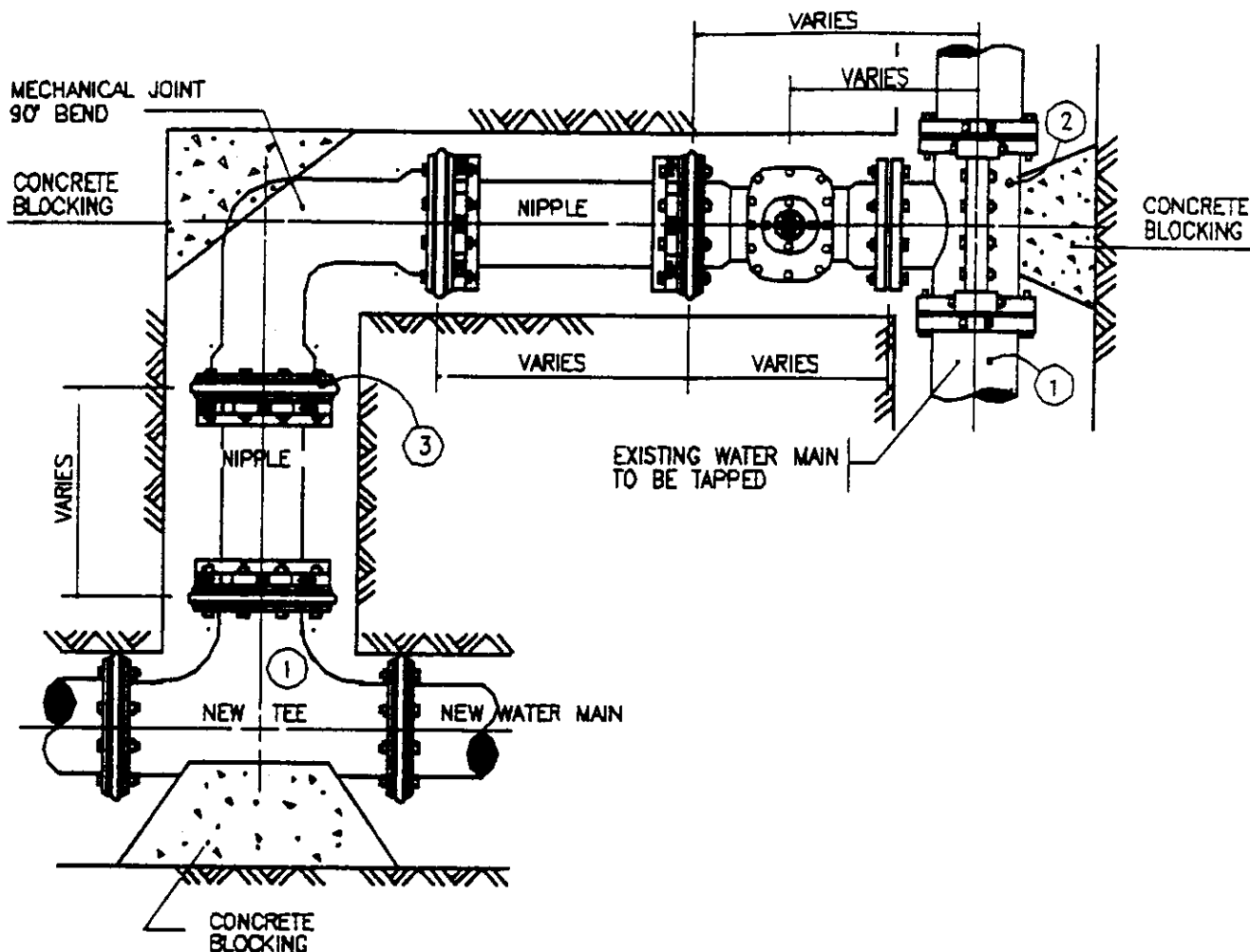




BOLLARD DETAIL
NOT TO SCALE

PAYMENT:
SHALL INCLUDE ALL MATERIALS AND ITEMS
REQUIRED FOR A COMPLETE INSTALLATION.

SYM. D.S. NO.		ACTION	DATE	DESCRIPTION OF REVISION
NTE, Incorporated ENGINEERS • ARCHITECTS PLANNERS • SURVEYORS		U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA		
DESIGNED BY:	REPAIR AND INSTALLATION OF			
MAJ	WATER DISTRIBUTION LINES			
DRAWN BY:	BOLLARD DETAIL			
NPS				
CHECKED BY:				
RT				
SUBMITTED BY:	SOL. NO.	DATE: MAY 98		
	CONTR. #: DACAB3-95-D-0014		SEQUENCE NO.	
CHIEF ENGINEER	DATE	SHEET NO. 13 OF 30		




TYPICAL ROLL - OVER CONNECTION USING TAPPING SLEEVE & VALVE

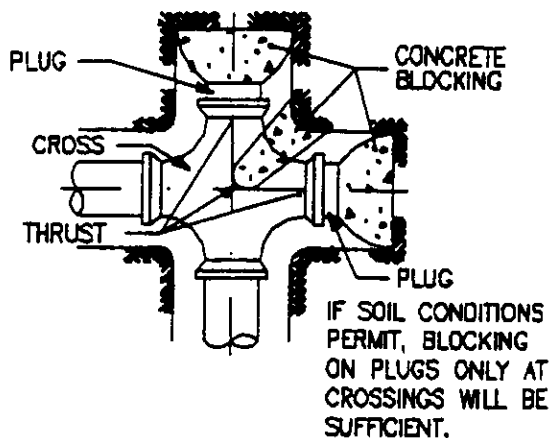
NOTES:

- ① CONNECTION BETWEEN TWO MAINS MADE WITH TAPPING SLEEVE. VALVE SHOWN IN THE VERTICAL POSITION. VALVE MAY BE INSTALLED HORIZONTAL, EITHER TO RIGHT OR LEFT WITH APPROVAL OF THE CONTRACTING OFFICER.
- ② MECHANICAL JOINT OR STEEL SLEEVE AS REQUIRED HEREIN.
- ③ ALL TIE - INS AND BENDS REQUIRE MECHANICAL RESTRAINTS.
- ④ CONNECTION BETWEEN NEW AND EXISTING WATER MAINS SHOWN AS TYPICAL. EXACT ORIENTATION VARIES AND REQUIRED FITTINGS MAY VARY.

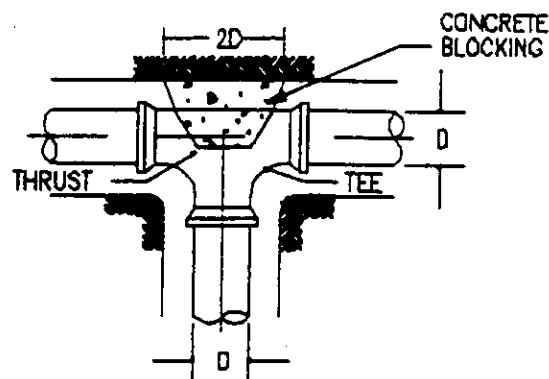
PAYMENT:

FITTINGS, MECHANICAL JOINT RESTRAINTS,
AND ALL OTHER MATERIALS COVERED IN SEPARATE BID ITEMS.

SYM. P.D. NO. ACTION DATE		DESCRIPTION OF REVISION	
 NTB, Incorporated ENGINEERS - ARCHITECTS PLANNERS - SURVEYORS		U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA	
DESIGNED BY: MAJ	REPAIR AND INSTALLATION OF WATER DISTRIBUTION LINES WET CONNECTIONS		
DRAWN BY: NPS			
CHECKED BY: NT			
SUBMITTED BY:	SOL. NO.	DATE: MAY 96	
(OVERSEER)	DATE	CONTR. #: DAC63-95-D-0064	SEQUENCE NO.
		SHEET NO. 14 OF 30	

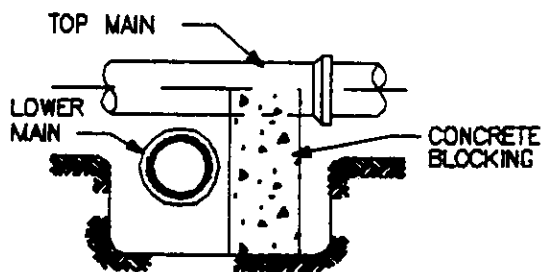


TYPICAL BLOCKING OF CROSS
AND TWO PLUGS

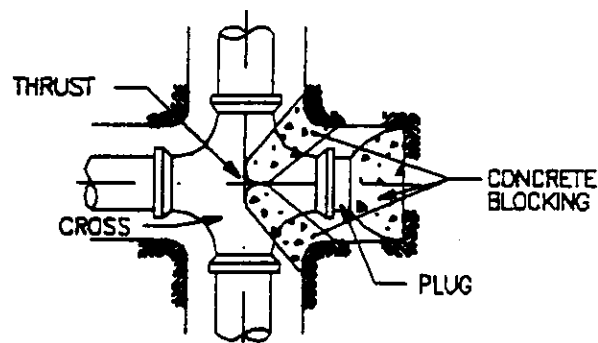


BLOCKING FOR TEE

CROSSING NEAR BELL OF TOP MAIN,
USE SUPPORT AS SHOWN. CROSSING
NEAR CENTER OF SPAN, USE SUPPORT
ON EACH SIDE OF PIPE.

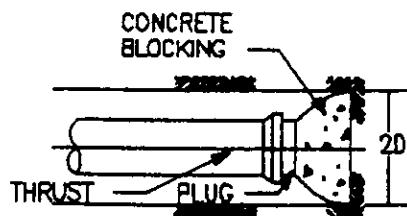


PIPE SUPPORT AT
CROSSING OF MAINS



IF SOIL CONDITIONS PERMIT,
BLOCKING ON PLUGS ONLY AT
CROSSINGS WILL BE SUFFICIENT.

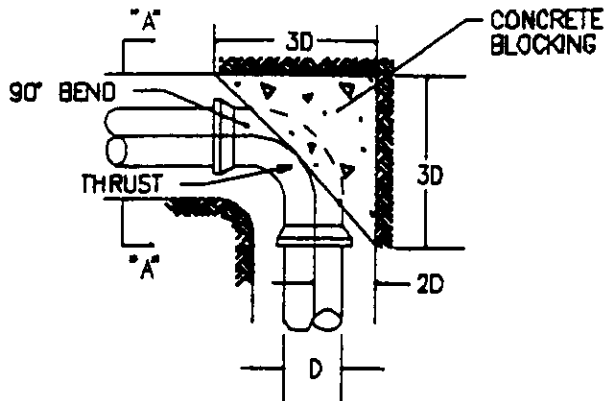
TYPICAL BLOCKING OF CROSS
AND PLUG



BLOCKING FOR PLUGS

PAYMENT:
INCIDENTAL AND INCLUDED IN FITTING
BID ITEM.

SYM. P.D. NO.		ACTION		DATE	DESCRIPTION OF REVISION	
		NTE, Incorporated ENGINEERS • ARCHITECTS PLANNERS • SURVEYORS		U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA		
DESIGNED BY:	REPAIR AND INSTALLATION OF WATER DISTRIBUTION LINES THRUST BLOCKING					
DRAWN BY:	1 OF 2					
CHECKED BY:						
SUBMITTED BY:	SOL. NO.		DATE:		MAY 98	
(ENGINEER)		DATE		CONTR. #:		SEQUENCE NO.
		SHEET NO.		1d OF 3d		

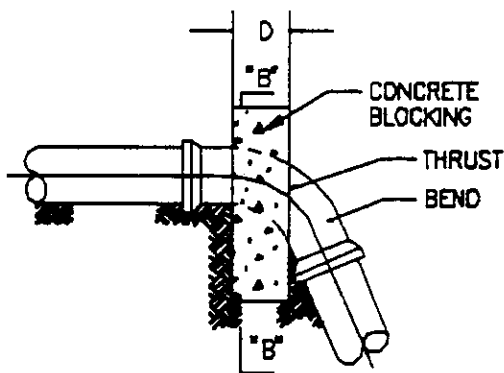


TYPICAL BLOCKING
FOR BENDS 45° - 90°

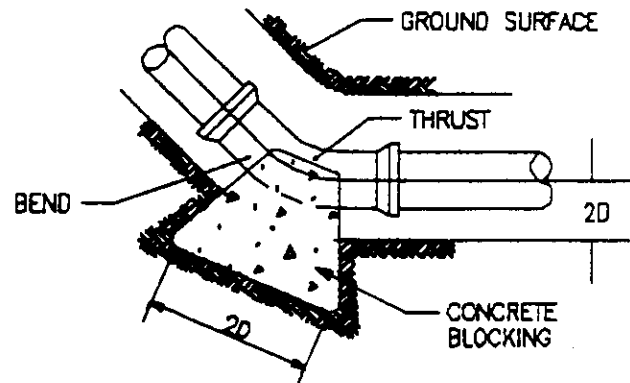
MINIMUM Sq. Ft. Bearing Area Against
Undisturbed Soil Required for Blocking Bends

PIPE DIA.	BEND "DEGREES"			
	90°	45°	22 1/2°	11 1/4°
6"	3	2	2	2
8"	5	3	2	2
10"	7	4	2	2
12"	10	5	3	2
16"	17	9	5	3
18"	21	12	8	3
20"	26	14	8	4
24"	38	20	11	6
30"	60	32	16	9
36"	84	46	23	12

REQUIRED AREA
FOR BLOCKING



SUPPORT FOR BENDS



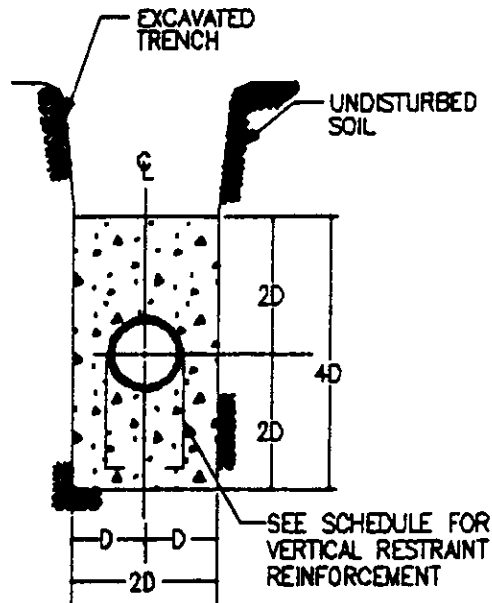
TYPICAL BLOCKING
FOR BENDS < 45°

NOTES:

1. FOR PIPE 6" IN DIAMETER AND SMALLER THE "D" DIMENSION SHALL NOT BE LESS THAN 6".
2. THRUST BLOCKING SHALL NOT LIMIT FLEXIBILITY OF JOINTS AND OTHER FITTINGS.
3. BLOCKING SHALL BE CLASS "A" CONCRETE.
4. WEIGHT CONDITIONS TO BE BASED ON THRUST DUE TO STATIC PRESSURE OF +50% THRUST = L.A.P.
 $\sin 1/2 \theta$, WHERE:
 A = AREA OF PIPE AND P = WATER PRESSURE
5. CONCRETE BLOCKING REQUIRED GREATER THAN DIMENSION INDICATED SHALL BE AT CONTRACTORS EXPENSE.

PAYMENT:
INCIDENTAL AND INCLUDED IN FITTING
BID ITEM.

DESIGNED BY: MAJ	NTB, Incorporated ENGINEERS - ARCHITECTS PLANNERS - SURVEYORS	U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA
DRAWN BY: MPS	REPAIR AND INSTALLATION OF WATER DISTRIBUTION LINES THRUST BLOCKING 2 OF 2	
CHECKED BY: RT	SUBMITTED BY:	SOL. NO. DATE: MAY 98
ENGINEER	DATE	CONTR. #: DACM3-95-0-0084 SHEET NO. 18 OF 30 SEQUENCE NO.



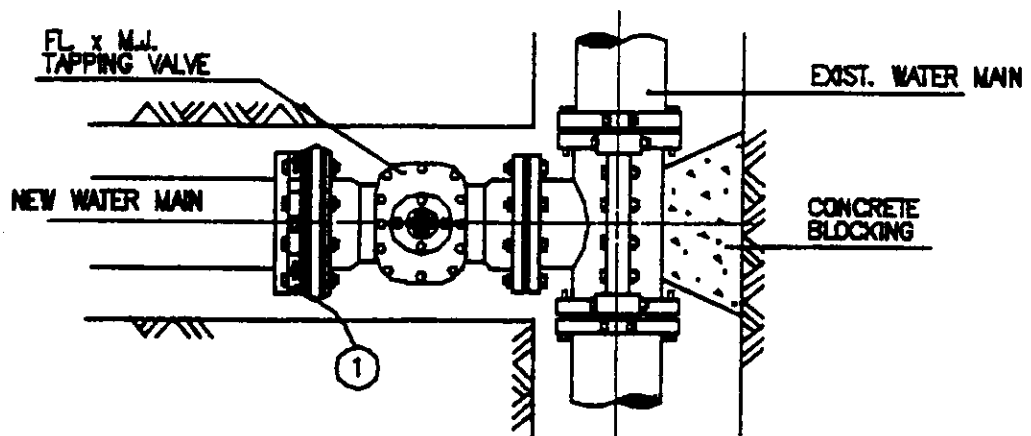
D = NOMINAL DIAMETER OF PIPE

REINFORCEMENT SCHEDULE

VERTICAL THRUST UP (11 1/4° TO 90°)					
PIPE DIAMETER	11 1/4° TO 22 1/2°		45° TO 90°		HOOKS (EA. END)
	NO. BARS	SIZE BARS	NO. BARS	SIZE BARS	
10" OR LESS	1	#4	2	#4	4"
12" TO 18"	2	#4	2	#5	6"
20" TO 36"	2	#5	2	#6	8"

PAYMENT:
INCIDENTAL AND INCLUDED IN FITTING
BID ITEM.

DESIGNED BY: MAJ		DRAWN BY: MPS		CHECKED BY: MT		SUBMITTED BY:		SOL. NO.		DATE: MAY 85	
NTB, Incorporated ENGINEERS - ARCHITECTS PLANNERS - SURVEYORS		U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA		REPAIR AND INSTALLATION OF WATER DISTRIBUTION LINES RESTRAINT OF FITTINGS							
CONTR. #:		SHEET NO.		DATE		CONTR. #:		SHEET NO.		DATE	
17		OF 30				17		OF 30			



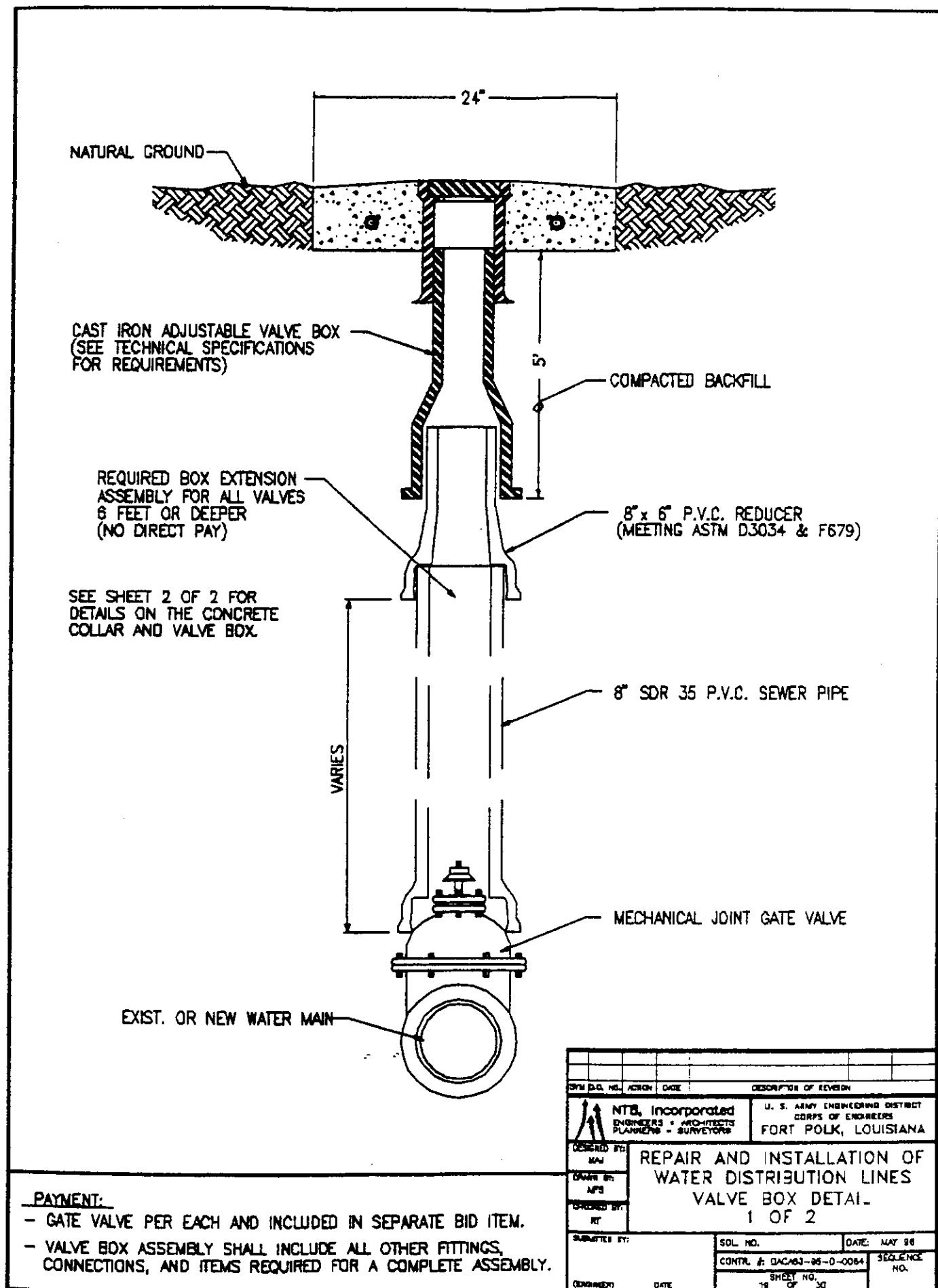
TYPICAL TAPPING SLEEVE & VALVE
NOT TO SCALE

① ALL TE - INS AND BENDS
REQUIRE MECHANICAL RESTRAINTS.

PAYMENT:

- SHALL INCLUDE THE INSTALLATION OF MECHANICAL JOINT TAPPING SLEEVE IN EXISTING WATER LINE AND ALL CONNECTIONS AND FITTINGS FOR COMPLETION OF TAPPING SLEEVE.
- TAPPING VALVE SHALL BE PER EACH AND INCLUDE INSTALLATION OF TAPPING VALVE TO TAPPING SLEEVE AND NEW WATER LINE.

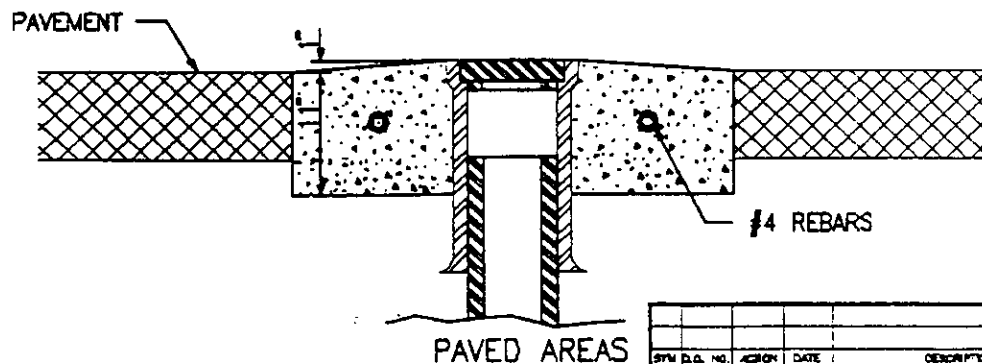
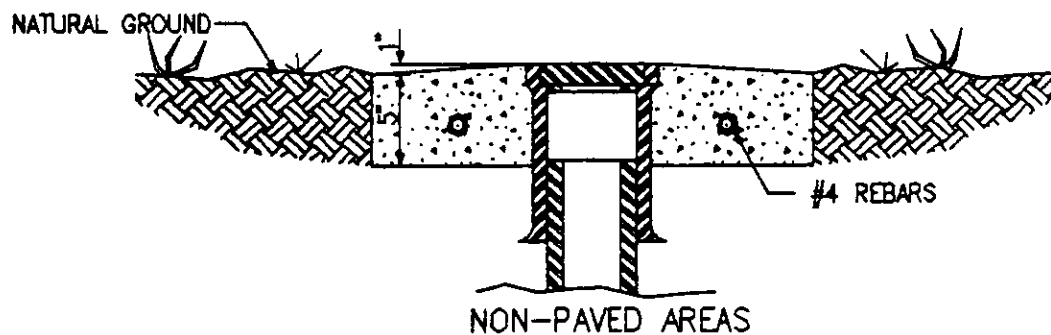
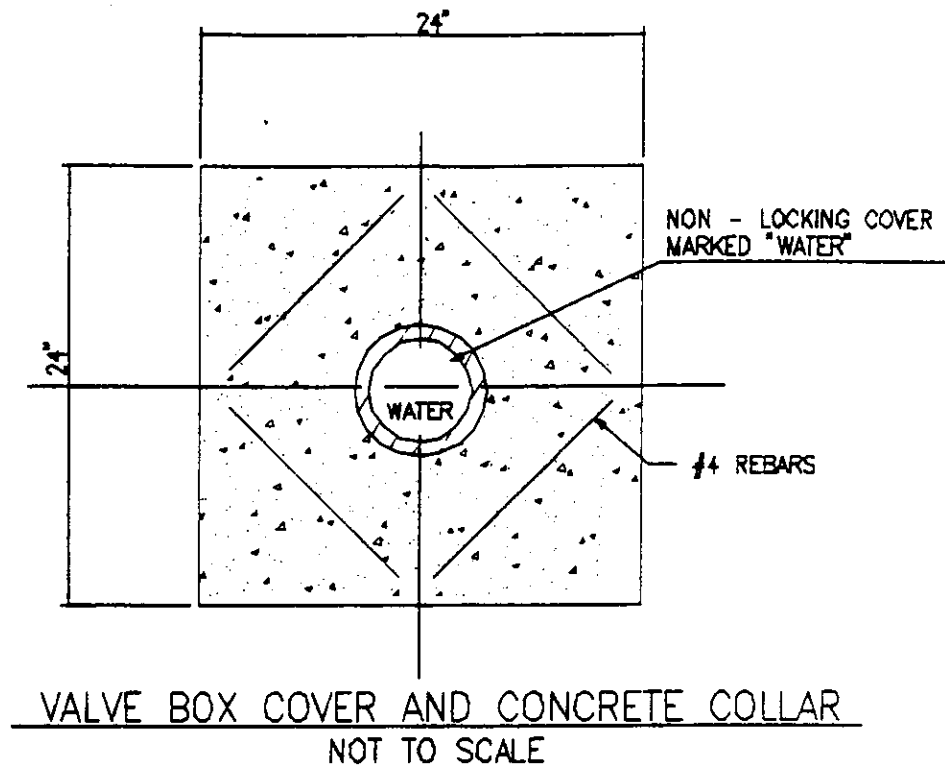
SYN. NO.		101		ACTION		DATE		DESCRIPTION OF REVISION	
NTB, Incorporated		ENGINEERS - ARCHITECTS		PLANNERS - SURVEYORS		U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA			
DESIGNED BY MAJ		REPAIR AND INSTALLATION OF WATER DISTRIBUTION LINES TAPPING SLEEVE & VALVE							
DRAWN BY MPS									
CHECKED BY RT		SUBMITTED BY		SOL. NO.		DATE		MAY 95	
				CONTR. #		DACA63-95-0-0084		SEQUENCE NO.	
				SHEET NO.		18		OF 30	
(ENGINEER)		DATE							




PAYMENT:

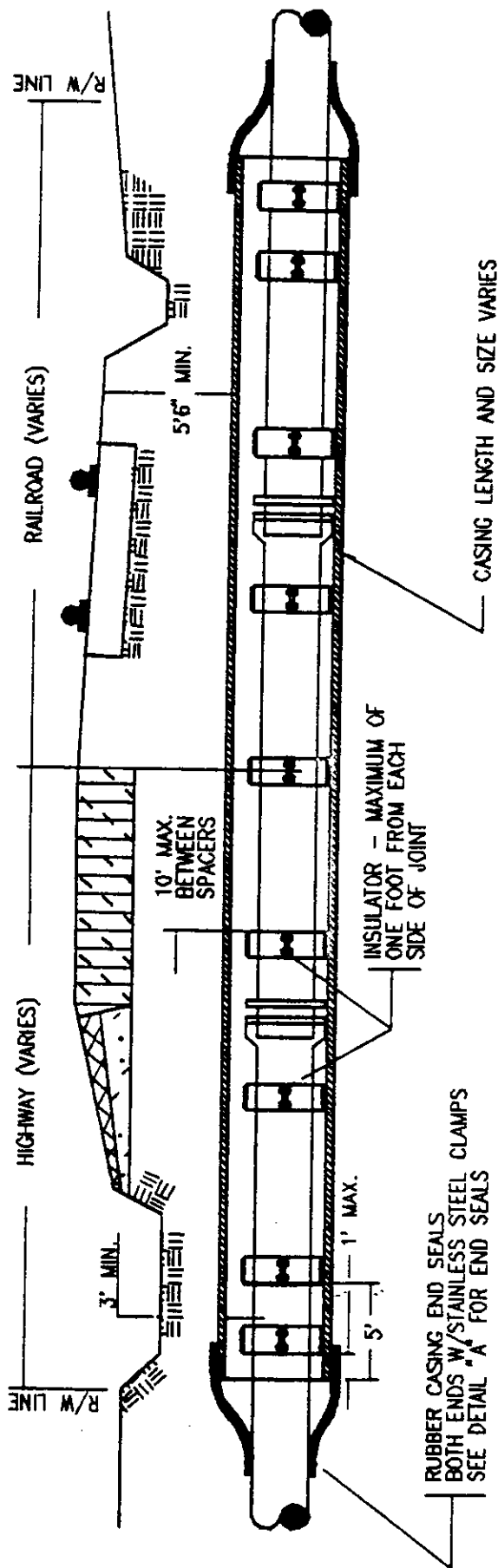
- GATE VALVE PER EACH AND INCLUDED IN SEPARATE BID ITEM.
- VALVE BOX ASSEMBLY SHALL INCLUDE ALL OTHER FITTINGS, CONNECTIONS, AND ITEMS REQUIRED FOR A COMPLETE ASSEMBLY.

NTB, Incorporated ENGINEERS - ARCHITECTS PLANNERS - SURVEYORS		U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA	
DESIGNED BY: MAJ		REPAIR AND INSTALLATION OF WATER DISTRIBUTION LINES VALVE BOX DETAIL 1 OF 2	
DRAWN BY: MPS		SOL. NO.	
CHECKED BY: RT		DATE: MAY 88	
SUBMITTED BY:		CONTRACT # DACC83-86-0-0084	
(ENDORSEMENT) DATE		SHEET NO. 18 OF 30	
		SEQUENCE NO.	




PAYMENT:
SHALL BE INCLUDED IN
VALVE BOX BID ITEM.

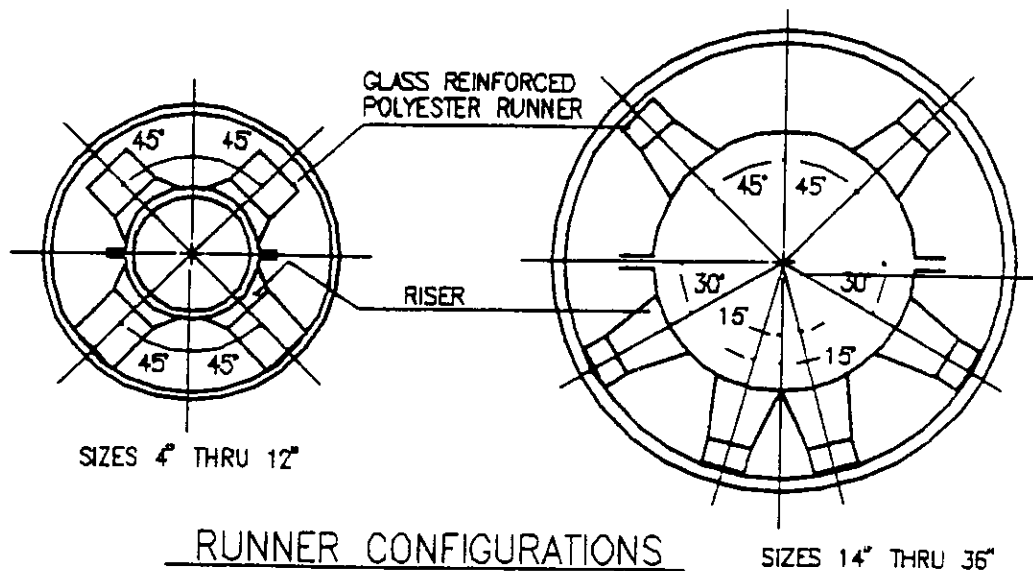
SYN. D.O. NO.	ACRON	DATE	DESCRIPTION OF REVISION
 NTB, Incorporated ENGINEERS • ARCHITECTS PLANNERS • SURVEYORS			U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA
DESIGNED BY: MAJ	REPAIR AND INSTALLATION OF WATER DISTRIBUTION LINES VALVE BOX COVER AND CONCRETE COLLAR 2 OF 2		
DRAWN BY: MPS			
CHECKED BY: RT			
SUBMITTED BY:	SOL. NO.	DATE: MAY 86	
(ENGINEER)	DATE	CONTR. # DAC483-95-0-0064	SEQUENCE NO.
		SHEET NO. 20 OF 30	



NOTE:
 CASING PIPE SHALL BE WELDED STEEL PIPE
 CASING 0.5000" WALL THICKNESS, ASPHALT
 COATED AND WRAPPED, OR 50 MILS LAYERED
 POLYETHYLENE TAPE WITH BUTYL BASED
 ADHESIVES, POLYKEN YG111 OR EQUAL.

PAYMENT:
 SHALL INCLUDE ALL FITTINGS, CONNECTIONS, AND
 PIPING FOR A COMPLETE CASING ASSEMBLY
 INCLUDING CARRIER PIPE AND INSULATORS.

REV. D.D. NO.		ACTION	DATE	DESCRIPTION OF REVISION
 NTB, Incorporated ENGINEERS - ARCHITECTS PLANNERS - SURVEYORS		U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA		
ORDERED BY: MAJ	REPAIR AND INSTALLATION OF			
OWNED BY: MPS	WATER DISTRIBUTION LINES			
CHECKED BY: RT	CASING AND WATER PIPE			
SUBMITTED BY:		SOL. NO.		DATE: MAY 58
(TWO INCHES)		CONTR. # DCA63-95-D-0064		SEQUENCE NO.
DATE		SHEET NO. 21 OF 30		

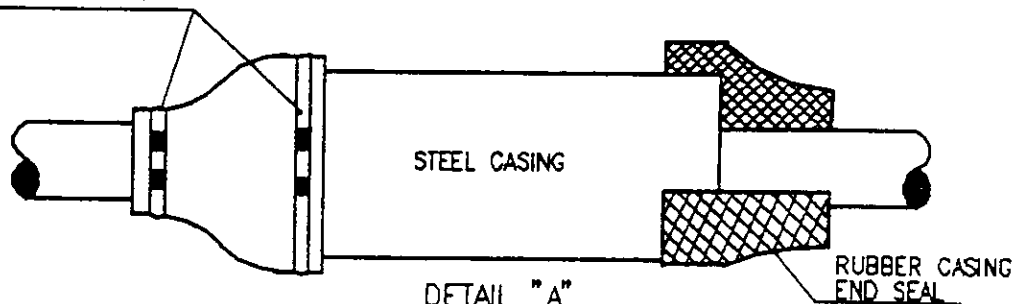


RUNNER CONFIGURATIONS

SIZES 14" THRU 36"

STAINLESS STEEL BANDS

(SECTION _____)

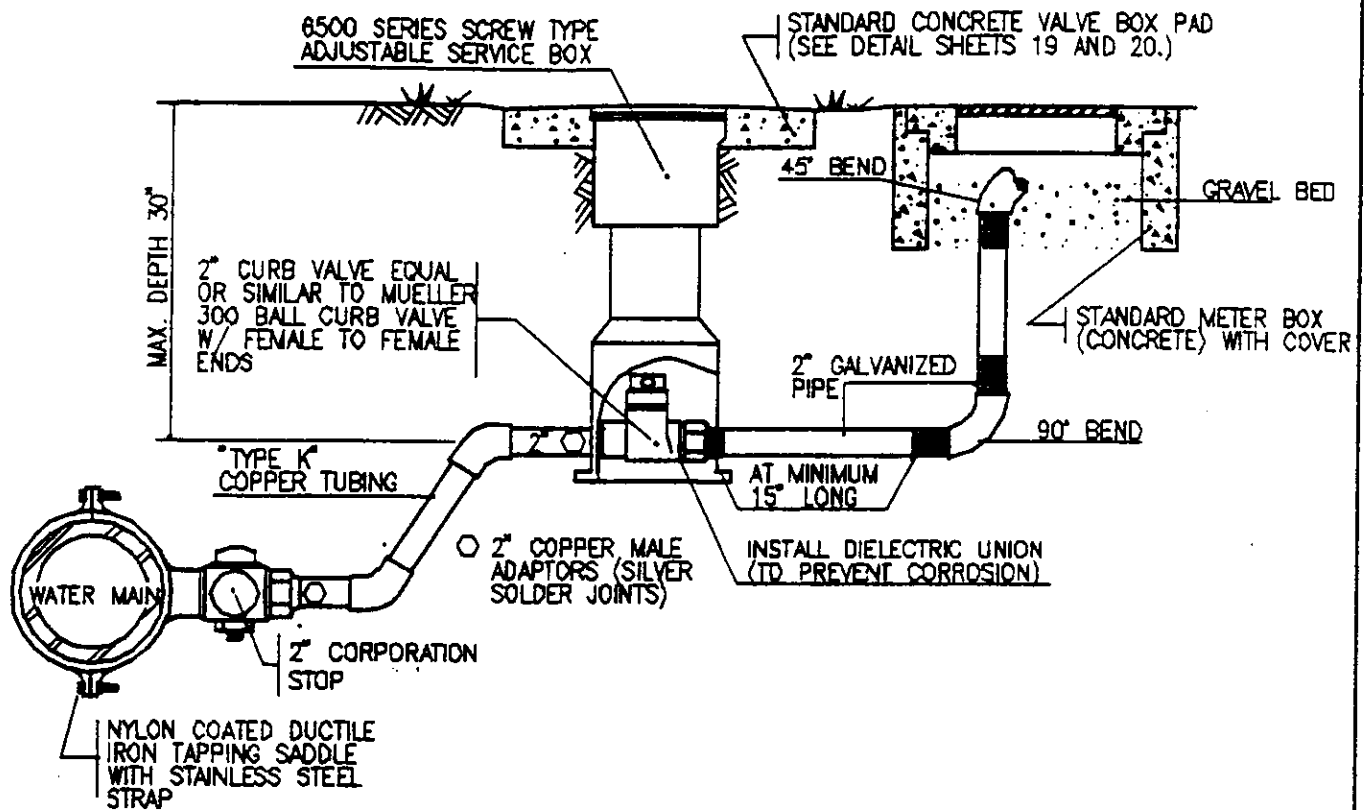


NOTES:

1. CROSSING TO BE IN STRICT ACCORDANCE WITH FORT POLK WHICH HAS PRECEDENCE OVER ALL OTHER.
2. CASING SHALL EXTEND FULL WIDTH OF RIGHT-OF-WAY.
3. FIELD CONDITIONS MAY WARRANT CHANGES, WITH APPROVAL OF THE CONTRACTING OFFICER.
4. CASING SPACERS SHALL BE MANUFACTURED STAINLESS STEEL OR STEEL FACTORY COATED WITH A FUSION BONDED COATING.
5. SPACING SHALL BE AS SHOWN ON DRAWING WITH MAXIMUM DISTANCE BETWEEN SPACERS TO BE 10 FEET FOR PIPE SIZES 4" - 14". 8 FEET FOR PIPE SIZES 16" - 36". FOR PIPES LARGER THAN 36" DIAMETER, CONSULT WITH THE MANUFACTURER.
6. CASING INSULATOR WIDTH SHALL BE 8" FOR PIPE SIZES 4" - 14". 12" FOR PIPE SIZES 16" - 36".
7. SPECIAL REQUIREMENTS FOR NON - SMOOTH CASING ID'S AND CROSSINGS IN EXCESS OF 300 FEET LONG, CONSULT WITH MANUFACTURER.
8. CONSULT WITH PIPE MANUFACTURER TO ASSURE PROPER SUPPORT OF PIPE.
9. CONTRACTOR SHALL SUBMIT MATERIAL PROPOSAL FOR PRIOR APPROVAL OF THE CONTRACTING OFFICER.
10. ALTERNATE METHODS OF CASING SPACERS (PIPE SKIDS) MAY NOT BE UTILIZED WITHOUT PRIOR WRITTEN APPROVAL OF THE CONTRACTING OFFICER.

PAYMENT:
INCLUDED IN CASING INSTALLATION.

NTB, Incorporated ENGINEERS • ARCHITECTS PLANNERS • SURVEYORS		U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA	
DESIGNED BY: MAJ		REPAIR AND INSTALLATION OF WATER DISTRIBUTION LINES CASING AND WATER PIPE INSTALLATION - 2 OF 2	
CHECKED BY: WFS			
SUBMITTED BY: RT			
SUBMITTED BY: (ENGINEER)		SOL. NO. _____ CONTR. #. DACARD-95-D-0084 SHEET NO. 22 OF 30	
DATE _____		DATE: MAY 98 SEQUENCE NO. _____	



2" BLOW OFF VALVE ASSEMBLY

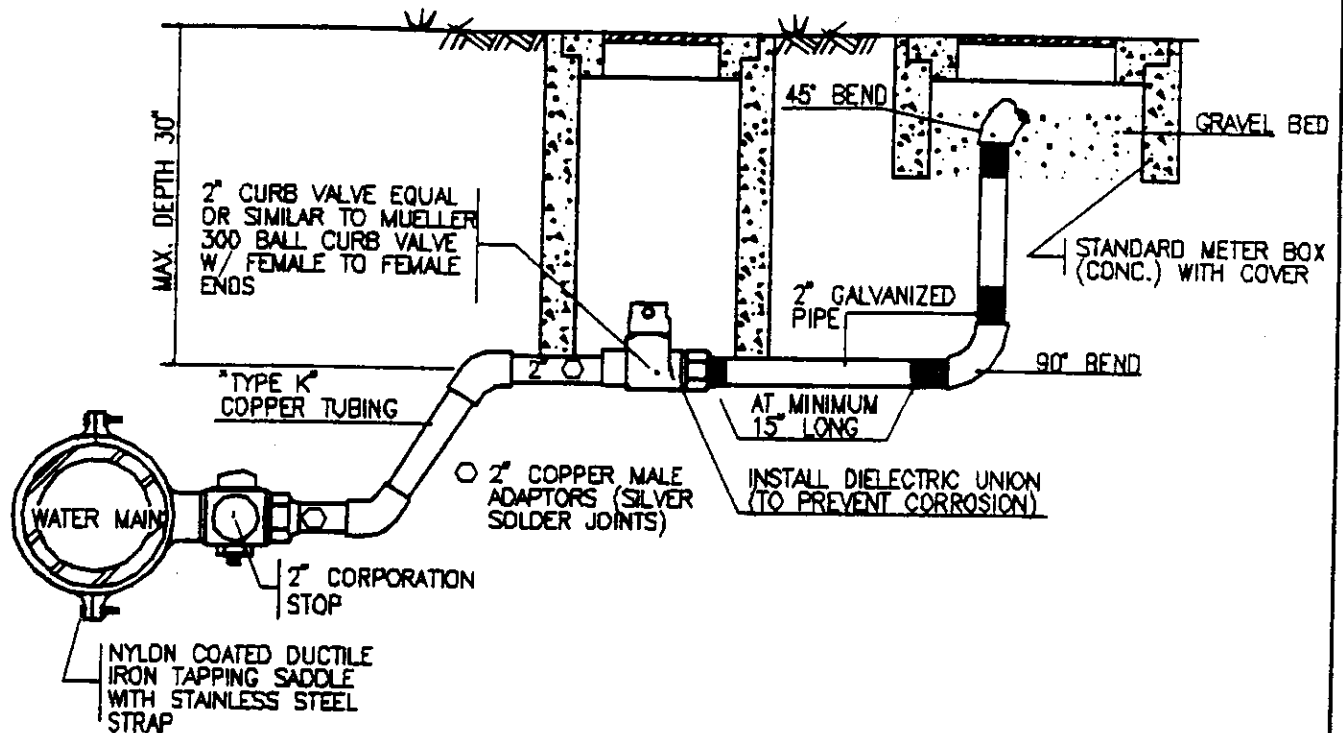
NOTE:

1. SIDE MOUNTED 2" BLOW - OFF ASSEMBLY IS REQUIRED ON ALL NEW CONSTRUCTED DEAD - END WATER MAINS WHEN FIRE HYDRANT IS NOT REQUIRED.
2. MAY BE ADDED TO EXISTING DEAD END LINES AS REQUIRED.

PAYMENT:

- WATER LINE TAPPING SADDLE AND 2" CORPORATION STOP SHALL BE PER EACH AND INCLUDED IN SEPARATE BID ITEM.
- WATER VALVE BOX AND COLLAR SHALL BE PER EACH AND INCLUDED IN SEPARATE BID ITEM.
- BLOW OFF ASSEMBLY SHALL INCLUDE ALL OTHER PIPING, FITTINGS, AND ITEMS NEEDED FOR A COMPLETE ASSEMBLY.

DESIGNED BY MAJ		DRAWN BY MFS		CHECKED BY HT		SUBMITTED BY	
NTB, Incorporated ENGINEERS • ARCHITECTS PLANNERS • SURVEYORS		U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA		REPAIR AND INSTALLATION OF WATER DISTRIBUTION LINES DEAD END BLOW OFF (VALVE BOX)		SOL. NO.	
DATE		DATE		DATE		DATE	
CONTR. #		DATE		SEQUENCE NO.		SHEET NO.	
23		OF		30		30	



2" BLOW OFF VALVE ASSEMBLY

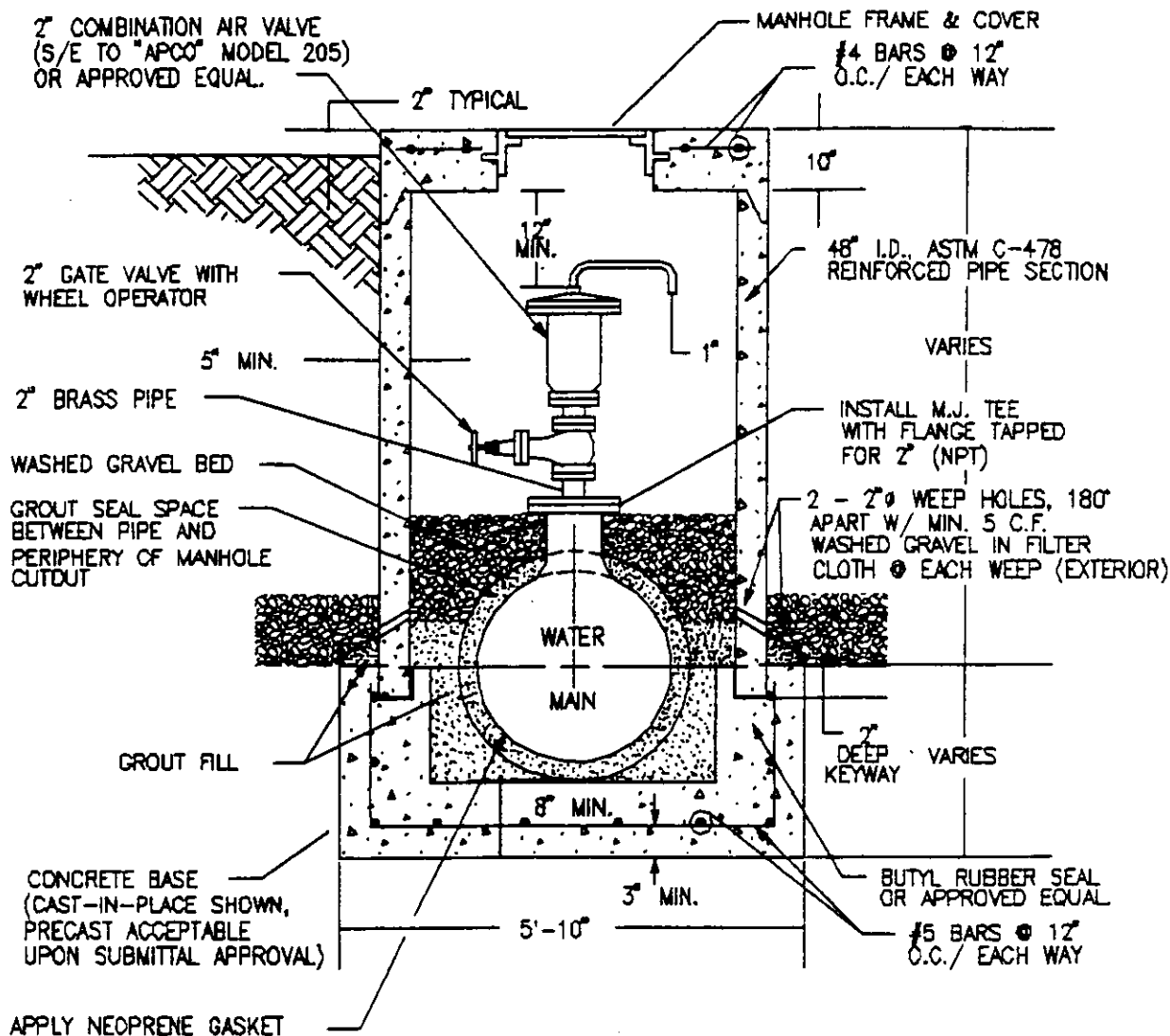
NOTE:

1. SIDE MOUNTED 2" BLOW - OFF ASSEMBLY IS REQUIRED ON ALL NEW CONSTRUCTED DEAD - END WATER MAINS WHEN FIRE HYDRANT IS NOT REQUIRED.
2. MAY BE ADDED TO EXISTING DEAD END LINES AS REQUIRED.

PAYMENT:

- WATER LINE TAPPING SADDLE AND 2" CORPORATION STOP SHALL BE PER EACH AND INCLUDED IN ANOTHER BID ITEM.
- WATER VALVE BOX AND COLLAR SHALL BE PER EACH AND INCLUDED IN ANOTHER BID ITEM.
- BLOW OFF ASSEMBLY SHALL INCLUDE ALL OTHER PIPING, FITTINGS, AND ITEMS NEEDED FOR A COMPLETE ASSEMBLY.

NTB, Incorporated ENGINEERS • ARCHITECTS PLANNERS • SURVEYORS		U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA	
DESIGNED BY: MAJ DRAWN BY: WFS CHECKED BY: RT SUBMITTED BY:		REPAIR AND INSTALLATION OF WATER DISTRIBUTION LINES DEAD END BLOW OFF (METER BOX OPTION)	
(ENGINEER) DATE:		SOL. NO. DATE: MAY 98 CONTR. #: DACAB3-95-D-0004 SHEET NO. 24 OF 30 SEQUENCE NO.	




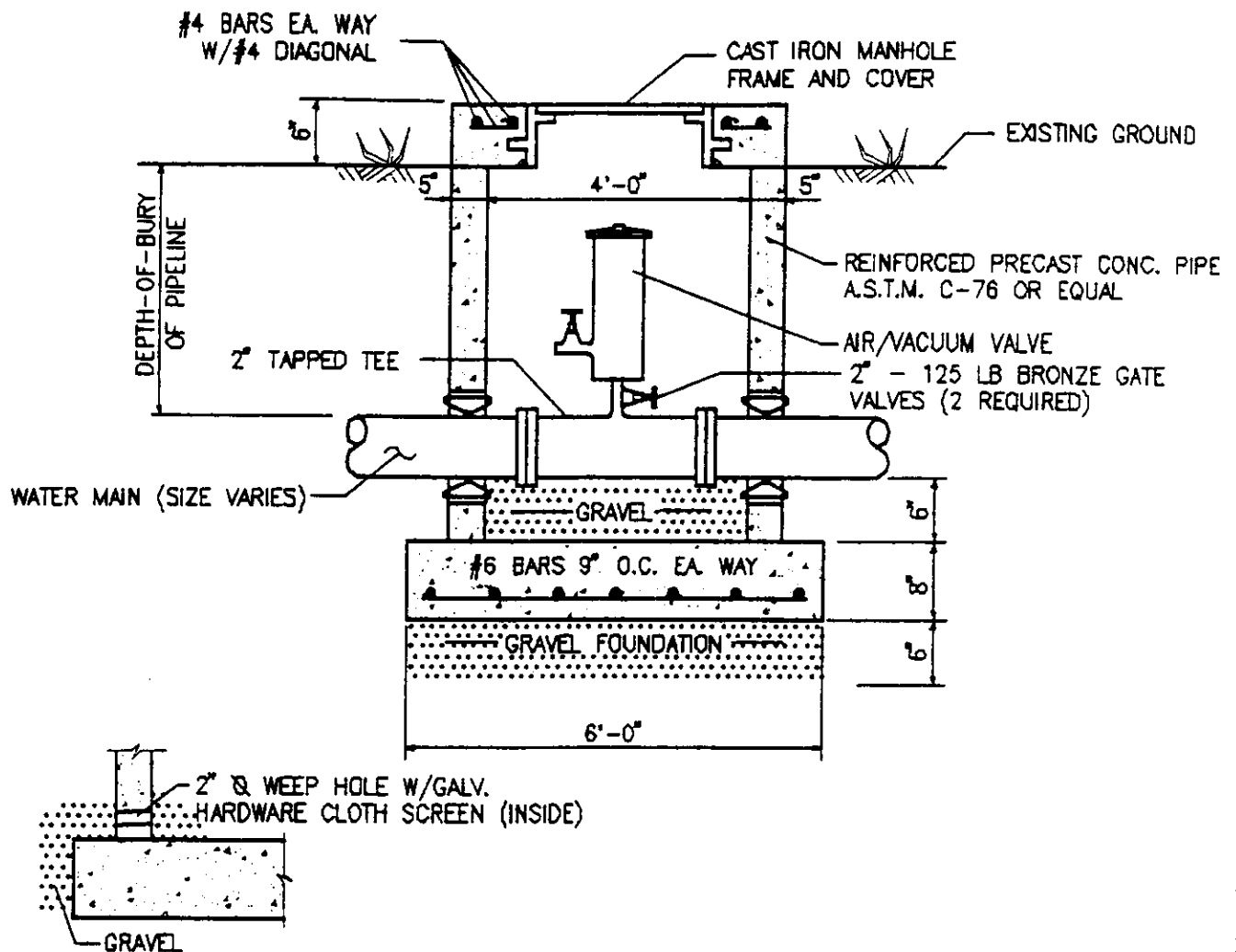
TYPICAL SECTION
NOT TO SCALE

NOTES:

1. APPLY BURLAP OR MIN. 8 MIL. TAR PAPER AROUND WATER MAIN BEFORE GROUTING.
2. MAINS GREATER THAN 20" NOMINAL DIMENSION SHALL REQUIRE SPECIAL DESIGN.

PAYMENT:
COMPLETE ASSEMBLY, INCLUDING ALL
PARTS, EQUIPMENT, AND FITTINGS.

SYN. DIAL. NON. ACTION: DATE		DESCRIPTION OF REVISION	
 NTB, Incorporated ENGINEERS - ARCHITECTS PLANNERS - SURVEYORS		U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA	
DESIGNED BY: NAJ	REPAIR AND INSTALLATION OF WATER DISTRIBUTION LINES AUTOMATIC AIR RELEASE VALVE		
DRAWN BY: MFS			
CHECKED BY: RT			
SUBMITTED BY:	SQL. NO.	DATE: MAY 98	
(ENGINEER)	DATE	CONTR. #: DMCAB-95-D-0084	SEQUENCE NO.
		SHEET NO. 25 OF 30	



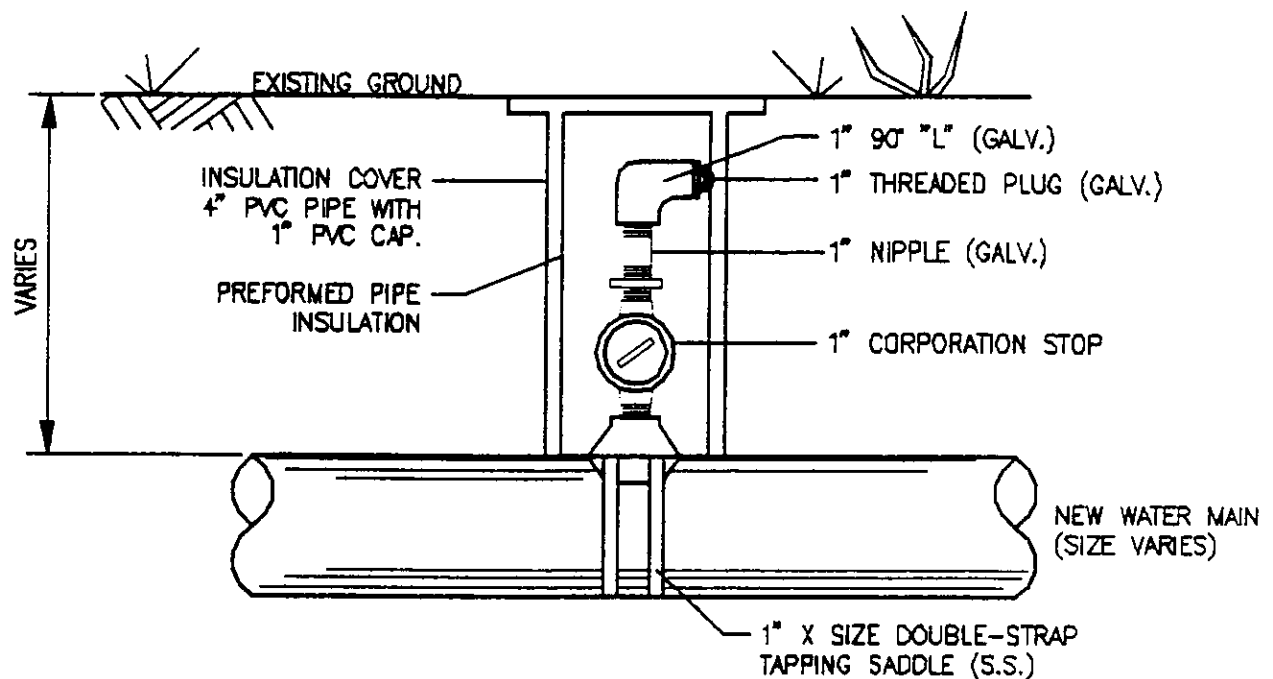
AIR VACUUM VALVE ASSEMBLY DETAIL

NOT TO SCALE

PAYMENT:
COMPLETE ASSEMBLY, INCLUDING ALL
PARTS, EQUIPMENT, AND FITTINGS.

SYN. DLS. NO. ACTION DATE		DESCRIPTION OF REVISION	
NTB, Incorporated ENGINEERS - ARCHITECTS PLANNERS - SURVEYORS		U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA	
DESIGNED BY: MAJ	REPAIR AND INSTALLATION OF WATER DISTRIBUTION LINES TYPICAL AIR VACUUM VALVE ASSEMBLY DETAIL		
DRAWN BY: BSC			
CHECKED BY: RT			
SUBMITTED BY:	SOL. NO.	DATE: MAY 98	
(CHECKED)	DATE	CONTR. #: DMC63-95-D-0064	SEQUENCE NO.
		SHEET NO. 26 OF 30	

FILENAME: 45_026




MANUAL AIR RELEASE VALVE
NOT TO SCALE

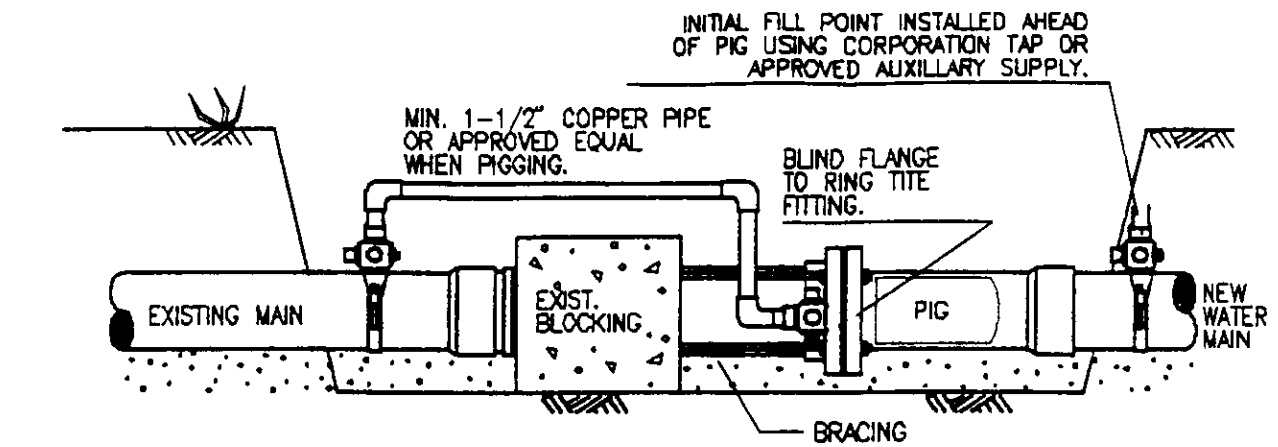
NOTES:

1. PROVIDE SADDLE, CORPORATION STOPS, AND ANY OTHER FITTINGS AS NECESSARY TO COMPLETE THE ASSEMBLY.

PAYMENT:

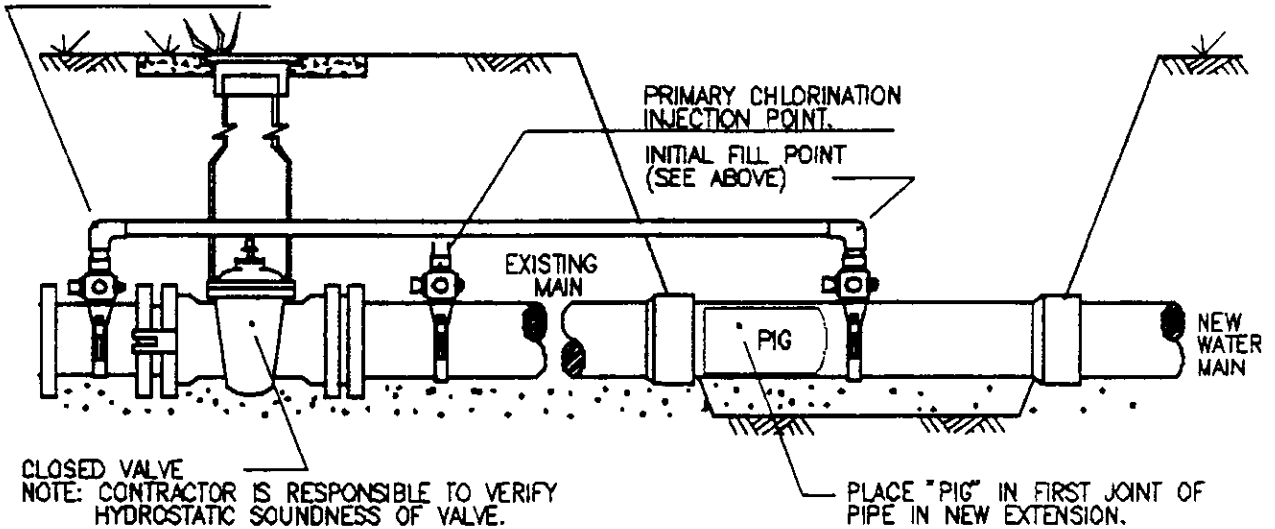
COMPLETE ASSEMBLY INCLUDING ALL PARTS, EQUIPMENT, AND FITTINGS.

SYN. D.D. NO. ACTION DATE		DESCRIPTION OF REVISION	
 NTB, Incorporated ENGINEERS - ARCHITECTS PLANNERS - SURVEYORS		U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA	
DESIGNED BY: NAJ	REPAIR AND INSTALLATION OF WATER DISTRIBUTION LINES MANUAL AIR RELEASE VALVE		
DRAWN BY: WSC	SUBMITTED BY: _____		
CHECKED BY: NT	SOL. NO. _____ DATE: MAY 98		
(ENGINEER) _____ DATE _____		CONTR. # DACAB3-95-0-0084 SHEET NO. 27 OF 30	SEQUENCE NO. _____



PREFERRED METHOD

AUXILIARY CHLORINATION POINT MUST BE APPROVED BY THE CONTRACTING OFFICER



ALTERNATIVE METHOD

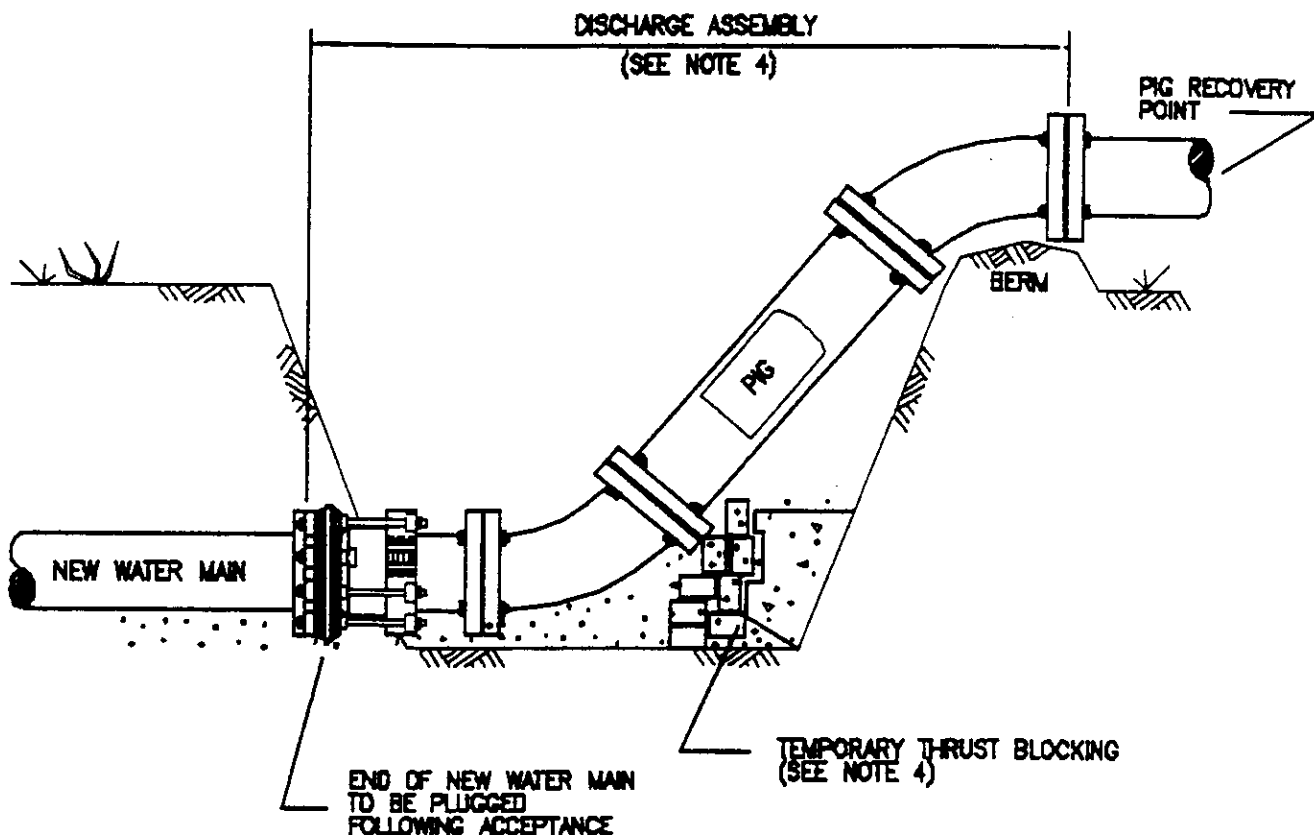
NOTES:

1. THE ENTIRE LINE SHALL BE FILLED WITH WATER BY AN AUXILIARY FILL POINT OR BY USING AN AUXILIARY TAP IN FRONT OF THE PIG. (AS SHOWN)
2. A PIG SHALL BE PLACED IN THE FIRST JOINT OF EACH PIPE SEGMENT TO BE CLEANED.
3. SINCE PROPELLING OF "PIG" THROUGH PIPE FITTINGS, MAY REQUIRE UP TO FULL SYSTEM PRESSURE, ADEQUATE BLOCKING MUST BE PROVIDED.
4. CLOSE NECESSARY VALVES TO ISOLATE PIPE SEGMENTS.
5. "PIGGING" OF MAINS SHALL NOT BE WAIVED WHEN BUTTERFLY VALVES ARE INSTALLED.
6. "PIGS" OR "SWABS" SHALL NOT BE REUSED.
7. ALL APPURTENANCES AND PIPE FOR TESTING LINE SHALL BE MANUFACTURED OF BRASS AND COPPER OR AN APPROVED EQUAL
8. PROVIDE SADDLE, CORPORATION STOPS, AND ANY OTHER FITTINGS AS NECESSARY TO COMPLETE THE ASSEMBLY.

PAYMENT:

INCIDENTAL AND INCLUDED IN PIPE BID ITEM.

BY	NO.	ACTION	DATE	DESCRIPTION OF REVISION
NTB, Incorporated ENGINEERS • ARCHITECTS PLANNERS • SURVEYORS				U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA
DESIGNED BY:	REPAIR AND INSTALLATION OF WATER DISTRIBUTION LINES TYPICAL DISINFECTION DETAILS			
DRAWN BY:				
CHECKED BY:				
SUBMITTED BY:	SOL. NO.		DATE: MAY 88	
(ENGINEER)	DATE		SEQUENCE NO.	
		SHEET NO. 26 OF 30		




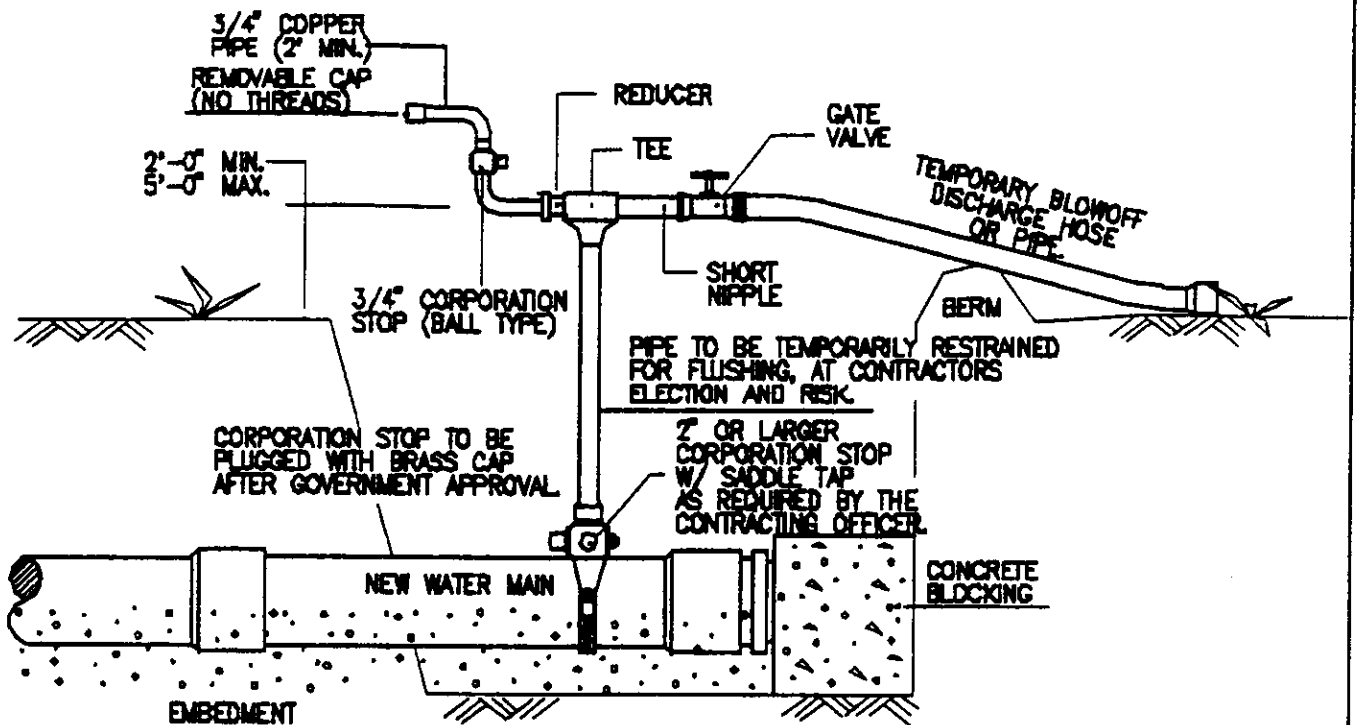
NOTES:

1. AFTER "PIGGING AND FLUSHING" NEW WATER MAIN MAY REQUIRE A PERMANENT PLUG PRIOR TO STERILIZATION.
2. IF CONDITIONS WARRANT, CONTRACTING OFFICER MAY REQUIRE ADDITIONAL PIGGING.
3. WATER SHALL BE KEPT OUT OF PIT.
4. PIPE ASSEMBLY, AMOUNT OF BLOCKING, AND/OR RESTRAINTS SHALL BE AT THE CONTRACTOR'S ELECTIONS AND RISK.
5. DISCHARGE WATER SHALL MEET EPA REGULATIONS PRIOR TO DISCHARGE INTO A FORT POLK STORM WATER SYSTEM.

PAYMENT:

INCIDENTAL AND INCLUDED IN PIPE BID ITEM.

REV. NO.		ACTION		DATE	DESCRIPTION OF REVISION
 NTB, Incorporated ENGINEERS • ARCHITECTS PLANNERS • SURVEYORS					U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA
DESIGNED BY:	MAJ	REPAIR AND INSTALLATION OF WATER DISTRIBUTION LINES PIGGING DISCHARGE ASSEMBLY			
DRAWN BY:	NPS				
CHECKED BY:	RT				
SUBMITTED BY:		SOL. NO.		DATE: MAY '96	
(ENGINEER)		DATE		CONTR. #: 04C63-15-D-0064 SHEET NO. 29 OF 30 SEQUENCE NO.	



NOTES:

1. ALL APPURTENANCES TO BE MANUFACTURED OF BRASS AND COPPER OR AN APPROVED EQUAL.
2. DISCHARGE WATER, GROUND WATER, AND SURFACE RUNOFF SHALL MEET EPA'S REGULATION PRIOR TO DISCHARGE INTO FORT POLK STORM WATER SYSTEM.
3. WATER SHALL BE KEPT OUT OF PIT.
4. TYPE AND/OR AMOUNT OF BLOCKING OR PIPE RESTRAINT REQUIRED SHALL BE AT THE CONTRACTORS ELECTION AND RISK.
5. CONTRACTOR SHALL SUBMIT TESTING, CLEANING, AND STERILIZATION PLAN INCLUDING MATERIALS AND METHODS FOR APPROVAL.
6. CONTRACTOR MAY ELECT TO SUBMIT AN APPROVED EQUAL ASSEMBLY.

PAYMENT:
INCIDENTAL AND INCLUDED IN PIPE BID ITEM.

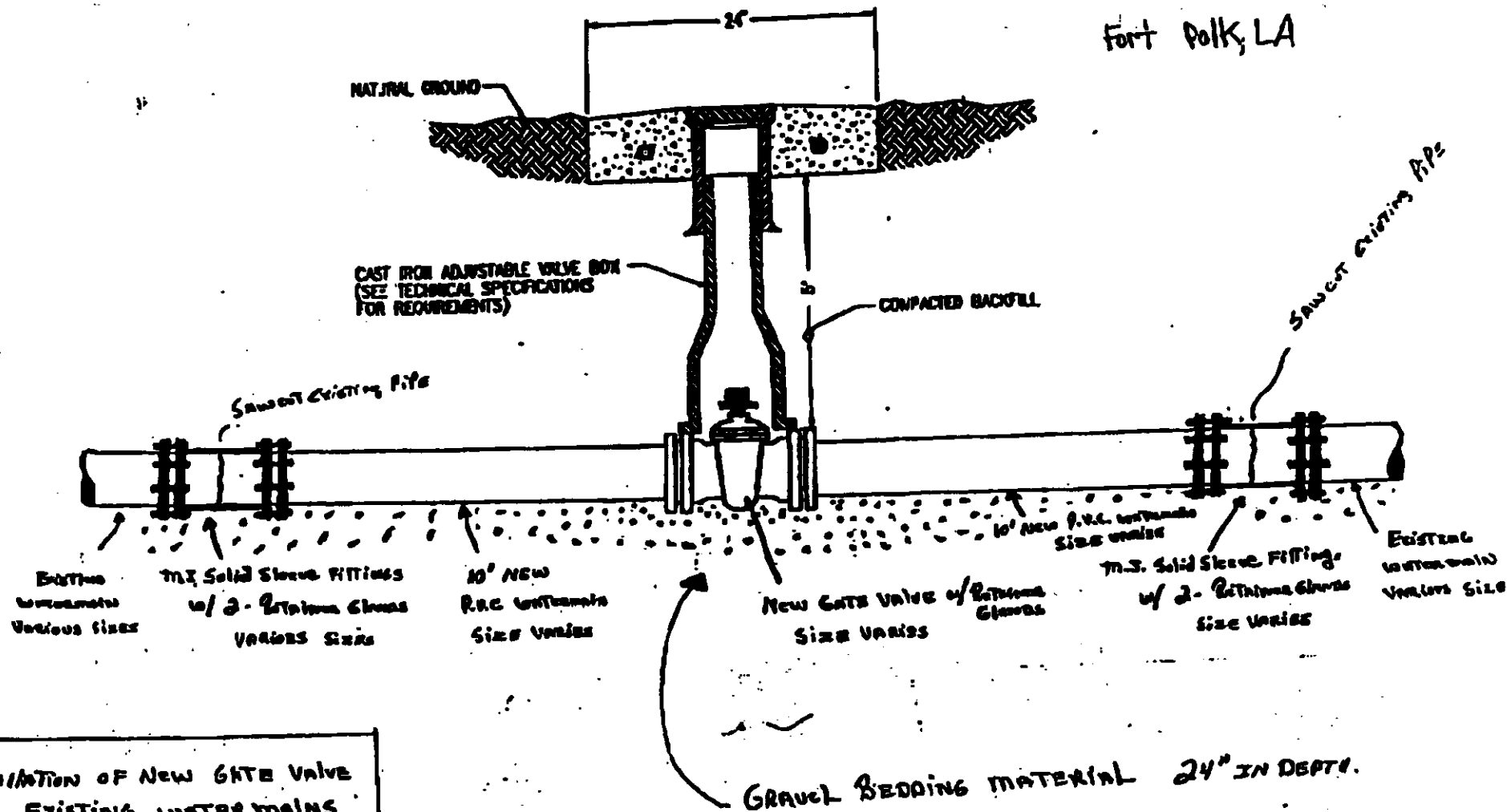
DESIGNED BY MAJ		DRAWN BY NPS		CHECKED BY RT		SUBMITTED BY	
NTE, Incorporated ENGINEERS - ARCHITECTS PLANNERS - SURVEYORS		U. S. ARMY ENGINEERING DISTRICT CORPS OF ENGINEERS FORT POLK, LOUISIANA				DATE: MAY 98	
REPAIR AND INSTALLATION OF WATER DISTRIBUTION LINES HEALTH SAMPLE TAP							
(OVERVIEW)		DATE		SQL NO. CONTR #1: DACAGJ-95-D-0084		SEQUENCE NO.	
				SHEET NO. 30 OF 32			

PAYMENT

Pipe, gate valves, valve boxes, retainer glands, solid sleeves and extra labor are covered in separate bid items.

DA-B7279-1

Fort Polk, LA



INSTALLATION OF NEW GATE VALVE
INTO EXISTING WATERMAINS